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UNITED STATES DEPARTMENT OF AGRICULTURE

# Soil Survey

of

# Dixon County, Nebraska

By

A. W. GOKE

United States Department of Agriculture, in Charge

and

L. A. BROWN

Nebraska Soil Survey

**Bureau of Chemistry and Soils**

In cooperation with the
University of Nebraska State Soil Survey
Department of the Conservation and Survey Division

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# SOIL SURVEY OF DIXON COUNTY, NEBRASKA[1]

By A. W. GOKE, United States Department of Agriculture, in Charge,
and L. A. BROWN, Nebraska Soil Survey

## COUNTY SURVEYED

Dixon County is in northeastern Nebraska. (Fig. 1.) Missouri River forms the northern boundary, separating the county from South Dakota. Ponca, in the northeastern part, is about 16 miles in an air line northwest of Sioux City, Iowa. The county is nearly rectangular. It comprises an area of 472 square miles, or 302,080 acres.

Dixon County is in that part of Nebraska known by the State geologists as the "loess-hill area." About 85 per cent of the county is upland, which ranges from nearly level to extremely rough and broken, and the remainder is alluvial land.

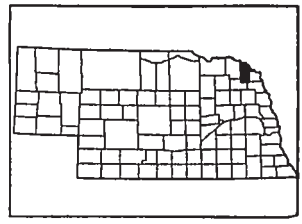


FIGURE 1.—Sketch map showing location of Dixon County, Nebr.

According to geologists the area included in Dixon County was probably part of a large gently southeastward sloping drift-covered plain which once covered eastern Nebraska. Following the melting and disappearance of the last, or Kansan, glacier the plain was subjected to severe erosion which in places removed the glacial deposits, exposing the underlying bedrock formations, and over some areas it produced a very rough and broken surface relief. Later the modified surface of the plain was blanketed to different depths with light-colored floury and limy silt, known as loess, which smoothed over the smaller irregularities and considerably reduced the sharpness of the larger ones. In the area now included in Dixon County subsequent erosion by Missouri River, Logan Creek, Aowa Creek, and tributaries to these streams considerably modified the original surface soil of the loess mantle in most places and in some places has removed the loess, exposing the underlying materials.

The most severely eroded area occupies a bluff-land strip 1 or 2 miles wide bordering the Missouri River alluvial lands around the northern and northeastern sides of the county, where the land surface has been carved into a succession of sharp-topped tortuous divides separated by narrow valleys ranging from 100 to 200 feet in depth, with steep and in many places precipitous slopes. Soil slipping is common, most of the slopes presenting a succession of short vertical exposures known as catsteps. Glacial sands or bedrock formations are exposed on some of the valley slopes and are at slight depths beneath the surface of the loessial mantle which covers most of them.

[1] Report written by F. A. Hayes.

Throughout the remainder of the northern half of the county the greater part of the upland is characterized by round-topped hills. The drainage pattern is intricate and steep slopes abound, but the valleys are considerably wider and shallower than those in the bluff-land strip, and numerous, though usually small, areas occur which are nearly level or gently undulating.

In the southern part of the county the surface of the upland ranges from nearly level to hilly, the greater part being strongly rolling. The valleys are broad, most of them having long and gradually sloping sides; most of the hills and divides have smoothly rounded tops; and nearly level or gently undulating areas are more numerous and larger than in the northern part of the county.

The topographic features in the different parts of the uplands prevail as described wherever the loessial mantle remains intact, as it does over about 95 per cent of the upland area, but this mantle is absent in many places throughout an upland strip, ranging from 1 to 6 miles in width, which extends across the county in a general northwest-southeast direction on the north side of the valley of Logan Creek. Throughout this strip about 30 per cent of the land is occupied by exposed areas of sand. In these areas erosion is negligible because the porous sand readily absorbs the surface water and there is practically no run-off. The sandy material, however, is considerably less stable than the material of the loess mantle and is more subject to erosion by the wind which, in some areas, has blown the sand into a series of low rounded ridges and mounds, creating a decidedly hummocky land surface. In most areas, however, the upper layer of sandy material contains sufficient silt blown in from surrounding loessial areas to prevent excessive drifting, and the surface relief is nearly level or gently undulating.

Alluvial lands occupy about 15 per cent of the total area of Dixon County and include the terraces and flood plains along the larger streams. The largest developments are along Missouri River, Logan Creek, and Aowa Creek. They occur as continuous strips except along Missouri River which impinges against the bluffs at several places on the Nebraska side of the stream dividing the alluvial land along the river in Dixon County into five large bodies.

The terraces occupy about 20 per cent of the alluvial lands, the largest developments bordering the bottom lands along Logan Creek, chiefly in the vicinity of Wakefield. The surface relief of the terraces is nearly level or very gently undulating. These terraces lie from 15 to 25 feet above the creek channel and are not subject to overflow from the main stream. The slopes between the terraces and flood plains are usually short and rather steep.

The flood plains, or bottom lands, in Dixon County are well developed along all the larger streams. They occupy the lowest land in the county and are subject to overflow during periods of high water. The largest developments are along Missouri River and Logan, Aowa, and Lime Creeks. The surface relief of the flood plains is level, modified in places by old and present stream channels, cut-offs, slight elevations, and shallow depressions.

The average elevation of Dixon County is about 1,400 feet above sea level, ranging from about 1,600 feet on the upland divides west of Martinsburg to about 1,100 feet where Missouri River crosses the

eastern boundary. The elevation [2] at Ponca is 1,145 feet; at Wakefield, 1,388 feet; at Emerson, 1,426 feet; at Newcastle, 1,284 feet; and at Concord, 1,435 feet above sea level. In general, the land slopes toward the southeast.

The larger streams in the northern part of the county are intrenched in their lower courses from 150 to 200 feet below the general level of the upland. They have steep gradients and are actively deepening their channels. In the southern part of the county Logan Creek, the only large stream, is intrenched less than 100 feet below the general upland level. This creek has a low gradient and prior to the artificial straightening of its channel was rather sluggish.

The county as a whole is well drained, and in many places throughout the uplands surface run-off is excessive and erosion is severe. The only areas having poor natural drainage are in the bottom lands, chiefly along Logan Creek and Missouri River, but most of these areas have been artificially drained.

The county is in the prairie region of the United States. On virgin upland areas big bluestem is the principal grass, although considerable needle grass grows in the more sandy places. The bottom-land grasses consist largely of bluestem, slough grass, and numerous water-loving grasses, together with sedges and reeds in the more poorly drained places. Natural forest, including elm, ash, oak, hackberry, boxelder, and cottonwood trees, occurs in narrow strips adjacent to the stream channels in most of the larger valleys. Trees are especially numerous on many of the lower slopes in the bluff-land strip bordering the Missouri River bottom lands. The trees are used locally for lumber but their chief value is for posts and fuel.

The first settlement in Dixon County was made in 1856, in Aowa Creek Valley, near the present site of Ponca. The county was established and organized in 1858, and its boundaries have remained unchanged since that time.

Most of the early settlers came from the Eastern and Central States, and they were chiefly of German and Swedish descent but a large proportion were of American birth. The 1930 Federal census [3] reports 91.4 per cent of the inhabitants as native whites and the remainder as foreign-born whites. Most of the foreign-born people are Germans, Swedes, and Czechs.

According to the Federal census the population of the county increased steadily from 247 inhabitants in 1860 to 11,815 in 1920. The 1930 census reports a slight decrease in population to 11,586. All the population is classed as rural and the density is 24.5 persons a square mile. The population is denser in the southern than in the northern part of the county. Ponca, in the northeastern part, is the county seat, and had 920 inhabitants in 1930. Wakefield had 1,015; Emerson, 563; Waterbury, 204; Newcastle, 446; Maskell, 131; Allen, 489; Concord, 257; Dixon, 222; and Martinsburg, 93. The towns and villages are rather evenly distributed over the county and furnish local markets and distributing points for farm implements, sup-

[1] GANNETT, H. A DICTIONARY OF ALTITUDES IN THE UNITED STATES. (FOURTH EDITION.) U. S. Geol Survey Bul. 274, 1,072 p. 1906.

[2] Soil survey reports are dated as of the year in which the field work was done. Later census figures are given when available.

plies, and produce. All of them, except Martinsburg, are served by railroads.

Dixon County has good transportation facilities. Railroads, which furnish good connections with outside points, cross the county in several directions The county is well supplied with gravel-surfaced State and Federal highways, and the county roads, although of earth construction are kept in good repair. Most of the roads follow land lines except in the rougher sections where they usually conform to the topography. Cement bridges and culverts are common even on the minor roads. Privately owned ferries are maintained on Missouri River near Ponca and Maskell.

All parts of the county have rural mail delivery, telephones are in common use, and the public-school system is highly developed.

## CLIMATE

The climate of Dixon County is typical of eastern Nebraska and is well suited to grain farming and livestock raising. The long warm summers are especially favorable to corn, and the low temperatures, which sometimes occur in winter, are not usually destructive to winter-grown crops, owing to the protection of snow. Surface relief does not differ sufficiently to cause an appreciable difference in climate within the county.

The average date of the last killing frost is May 7 and that of the first is October 2. This gives an average frost-free period of 148 days which is ample for the maturing and handling of all farm crops common to the region. Killing frosts have occurred as early as September 12 and as late as May 27. During the 24 years from 1897 to 1920 there were 10 years in which killing frosts occurred 10 or more days earlier in the fall than the average date and 3 years in which they were 10 or more days later in the spring.

The precipitation varies greatly from year to year. About 78 per cent of the mean annual precipitation falls from April to September, inclusive, or during the principal part of the growing season.

In the summer the precipitation usually occurs as heavy thundershowers, although torrential rains are rare. Drought is almost unknown during May and June, but in the latter part of July and during August short dry periods sometimes occur, although crops seldom suffer from lack of moisture when properly tended, as most of the soils have a high available moisture capacity.

The snowfall varies annually from a few inches to several feet. Most of the snow falls in the period from December to March, inclusive.

From about October 1 to April 1 the prevailing wind is from the northwest, and during the remainder of the year it is from a southerly direction. Strong winds are common, but tornadoes are rare.

Table 1, compiled from the records of the Weather Bureau station at Wakefield, gives the more important climatic data which are believed to be accurately representative of conditions throughout the county.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Wakefield, Nebr.*

[Elevation, 1,413 feet]

| Month | Temperature | | | Precipitation | | | |
|---|---|---|---|---|---|---|---|
| | Mean | Absolute maximum | Absolute minimum | Mean | Total amount for the driest year (1910) | Total amount for the wettest year (1923) | Snow, average depth |
| | °F | °F. | °F | Inches | Inches | Inches | Inches |
| December | 23 5 | 66 | −27 | 0 83 | 0.47 | 0 65 | 5 6 |
| January | 20 5 | 62 | −41 | 58 | .42 | 78 | 5 3 |
| February | 21 2 | 68 | −38 | 94 | 25 | (1) | 7 6 |
| Winter | 21 7 | 68 | −41 | 2 35 | 1 14 | 1 43 | 18 5 |
| March | 35 2 | 88 | −16 | 1 17 | 02 | 1 90 | 4 9 |
| April | 48 6 | 101 | 12 | 2 82 | 40 | 3 69 | 2 7 |
| May | 59 3 | 97 | 19 | 3 96 | 2.81 | 5 59 | 1 |
| Spring | 47.7 | 101 | −16 | 7 95 | 3 23 | 11 18 | 7 7 |
| June | 68.8 | 101 | 34 | 4 63 | 2 39 | 7 23 | 0 |
| July | 73 9 | 107 | 41 | 3 59 | 2 36 | 4 71 | 0 |
| August | 72.1 | 104 | 35 | 3.93 | 3 46 | 11 41 | 0 |
| Summer | 71.6 | 107 | 34 | 12 15 | 8.21 | 23 35 | 0 |
| September | 63 9 | 102 | 17 | 3 10 | 3 39 | 6 84 | 0 |
| October | 51 9 | 93 | 7 | 1 94 | 1 02 | 45 | 1 5 |
| November | 36 8 | 80 | −15 | 1 14 | 18 | 35 | 2 7 |
| Fall | 50 9 | 102 | −15 | 6 18 | 4 59 | 7 64 | 4 2 |
| Year | 48 0 | 107 | −41 | 28 63 | 17.17 | 43 60 | 30 4 |

[1] Trace

## AGRICULTURE

Dixon County is essentially agricultural. Prior to the entry of the white man the land was covered with a luxuriant growth of prairie grasses, together with heavy tree growth along the larger streams, especially in the northern part of the county. Much of the forest still remains, but most of the prairie sod has been broken for crop production.

As in most of Nebraska, early settlement was along the creeks and did not extend into the upland until the good valley land was taken up. Sod corn was usually the first crop the settlers planted, which with game and beef formed their chief food. Later, wheat, oats, barley, and garden vegetables were grown. The early agricultural development was somewhat retarded by lack of familiarity with local climatic and soil conditions, by the use of seed poorly adapted to the region, by insect pests, and by droughts. However, the settlers had the experiences of farmers to the east and southeast to draw on, and they rapidly adjusted their seed and farming practices to the requirements of the new region.

Corn has been the leading crop since farming began. Spring wheat ranked second in acreage until late in the eighties when the area devoted to oats about equaled that of wheat. The importance of wheat in the early agricultural development of the county was due largely to the fact that wheat was needed for food and as a cash

crop. The yields and profits from the crop were low, however, and as the farmers became better established, livestock became the most important source of revenue, and more feed was needed, consequently oats, being an important feed crop and well adapted to the soil and climate, were grown more and more extensively at the expense of the wheat acreage. Since 1900 the change to oats has been so rapid and complete that only 673 acres were devoted to the production of wheat in 1929.[4]

The value of all crops produced in Dixon County in 1929 was $4,963,046. Dairy products were produced to the value of $421,257 and poultry and eggs to the value of $373,793. The total value of all domestic animals on farms in the county on January 1, 1929, was $4,105,989.

Corn is by far the most important crop, followed by oats, wild hay, alfalfa, sweetclover, and barley, ranking in acreage in the order named. Minor crops include timothy and clover mixed, wheat, potatoes, rye, garden vegetables, and fruits.

Table 2, compiled from the Federal census reports and from the Nebraska Agricultural Statistics, gives the acreage and production of the principal crops grown in Dixon County in 1889, 1899, 1909, 1919, and 1929.

TABLE 2.—*Acreage and production of principal crops in Dixon County, Nebr., in stated years*

| Crop | 1889 | | 1899 | | 1909 | | 1919 | | 1929 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Acres* | *Bushels* | *Acres* | *Bushels* | *Acres* | *Bushels* | *Acres* | *Bushels* | *Acres* | *Bushels* |
| Corn | 48,065 | 1,646,767 | 77,375 | 2,374,190 | 96,150 | 3,658,768 | 93,786 | 3,079,961 | 125,396 | 5,015,840 |
| Oats | 13,641 | 346,291 | 19,280 | 672,770 | 49,632 | 1,304,352 | 52,169 | 1,383,728 | 54,236 | 1,952,496 |
| Wheat | 10,411 | 151,426 | 45,820 | 484,280 | 4,128 | 59,544 | 8,478 | 55,759 | 673 | 13,822 |
| Rye | 121 | 2,517 | 65 | 900 | 20 | 220 | 90 | 1,139 | 375 | 7,125 |
| Barley | 969 | 17,954 | 1,496 | 40,520 | 2,667 | 52,649 | 1,390 | 27,686 | 7,129 | 235,257 |
| Potatoes | 780 | 66,356 | 674 | 73,879 | 729 | 55,048 | 606 | 3,213 | 487 | 53,570 |
| | | *Tons* | | *Tons* | | *Tons* | | *Tons* | | *Tons* |
| All hay | 29,611 | 46,970 | | | | | | | | |
| Wild hay | | | 22,800 | 36,377 | 17,868 | 27,471 | 13,663 | 19,888 | 12,846 | 19,269 |
| Tame hay | | | 4,067 | 9,522 | 14,931 | 30,423 | 20,360 | 39,606 | 16,204 | 40,064 |
| Alfalfa [1] | | | 111 | 184 | 4,133 | 10,757 | 17,759 | 35,829 | 9,735 | 28,232 |
| Sweetclover [1] | | | | | | | | | 8,831 | |
| | *Trees* | *Bushels* | *Trees* | *Bushels* | *Trees* | *Bushels* | *Trees* | *Bushels* | *Trees* | *Bushels* |
| Apples | 2,619 | 1,286 | 24,813 | 2,066 | 27,053 | 46,121 | 13,377 | 5,135 | | |
| Plums and prunes | 2,504 | 303 | 10,127 | 324 | 7,071 | 1,472 | 2,662 | 186 | | |
| Cherries | 761 | 20 | 4,687 | 267 | 5,845 | 1,050 | 2,378 | 243 | | |
| | *Vines* | *Pounds* | *Vines* | *Pounds* | *Vines* | *Pounds* | *Vines* | *Pounds* | *Vines* | *Pounds* |
| Grapes | | | 14,489 | 5,300 | 9,995 | 87,365 | 3,361 | 10,454 | | |

[1] Included in tame hay.

In 1929 the value of all crops was somewhat greater than that of livestock and livestock products, but the returns derived from livestock are the leading sources of revenue because most of the crops are used for feed on the farms where they are produced.

Table 3 compiled from the Federal census reports and from the 1929 Nebraska Agricultural Statistics gives the number and value of domestic animals, poultry, and bee colonies in the county in 1900, 1910, 1920, and 1929.

[4] Data for 1929 are from the Nebraska Agricultural Statistics, and other data are from the Federal census reports

TABLE 3.—*Number and value of domestic animals, poultry, and bee colonies in Dixon County, Nebr., in stated years*

| Kind of animal | 1900 | | 1910 | | 1920 | | 1929 | |
|---|---|---|---|---|---|---|---|---|
| | *Number* | *Value* | *Number* | *Value* | *Number* | *Value* | *Number* | *Value* |
| Cattle | 35,857 | | 32,854 | $846,934 | 35,362 | $2,033,247 | 31,046 | $1,866,716 |
| Swine | 72,227 | | 59,185 | 537,798 | 76,635 | 1,754,192 | 94,659 | 1,416,509 |
| Horses | 8,869 | | 10,751 | 1,183,179 | 10,091 | 1,001,591 | 9,628 | 583,389 |
| Mules | 638 | | 654 | 85,205 | 907 | 122,197 | 739 | 56,371 |
| Sheep | 1,335 | | 837 | 4,392 | 624 | 7,388 | 2,357 | 22,347 |
| All poultry | 107,773 | $29,409 | 118,414 | 49,336 | 145,197 | 133,193 | 170,912 | 160,657 |
| Bee colonies | 232 | 1,350 | 442 | 1,415 | 924 | 4,905 | 303 | |
| Value of all domestic animals | | [1] 1,764,926 | | [1] 2,658,151 | | [1] 4,919,222 | | [2] 4,105,989 |

[1] Includes the value of a few animals not listed but does not include the value of poultry and bees.
[2] Value of items listed.

Approximately 71 per cent of the land in the county was cultivated, 16.5 per cent was in range and pasture land, and about 3 per cent in woodland in 1929.

Table 4, compiled from the 1929 Nebraska Agricultural Statistics, shows the average acre yield of the most important hay and grain crops grown in the county during the period 1916 to 1925, inclusive, and the average acre yield and approximate percentage of cultivated land devoted to each crop in 1929.

TABLE 4.—*Average acre yield for 10-year period and average acre yield and percentage of cultivated land in given crops in 1929.*

| Crop | Average acre yield, 1916–1925, inclusive | Average acre yield, 1929 | Percentage of cultivated land occupied by crop in 1929 |
|---|---|---|---|
| | *Bushels* | *Bushels* | *Per cent* |
| Corn | 34.4 | 40 | 58.5 |
| Oats | 32.7 | 36 | 25.3 |
| | *Tons* | *Tons* | |
| Wild hay | 1.49 | 1.5 | 6.0 |
| Alfalfa | 2.73 | 2.9 | 4.5 |

Most of the farm buildings are well painted and kept in good repair, and many of the houses are equipped with modern conveniences. In 1929 two hundred and fifty-seven of the farmhouses had electric-lighting systems, 258 had modern water systems, and 648 had radios. The farms are fenced mainly with barbed wire, though many of them are inclosed with hog-tight woven-wire fencing. The work animals include draft horses and mules. There were 299 tractors, 99 trucks, and 1,443 automobiles on the farms in 1929. Most farms are well equipped with modern labor-saving machinery such as gang or sulky plows, disks, drills, corn planters, cultivators, and complete equipment for harvesting hay. Farm equipment in the county in 1929 included 71 grain threshers, 15 combines, and 1,206 cream separators, and many farms are equipped with corn binders, corn shuckers, and chicken incubators. The more expensive machinery is sheltered.

Farm laborers are usually plentiful except during the small-grain harvest season when there is often a scarcity of good help. Wages

range from $30 to $40 a month with board and lodging. Day labor during the harvest season commands from $3.50 to $4. The price of threshing is 3 or 4 cents a bushel for oats and 6 or 7 cents for wheat. Corn shuckers commonly receive 5 or 6 cents a bushel for shucking corn.

In 1930, 96.2 per cent of the county was in farms and 95.8 per cent of the farm land was crop land and pasture land. Most of the farms range in size from 100 to 500 acres. The average size is 189.9 acres. Owners operated 46.3 per cent, tenants 52.9 per cent, and managers 0.8 per cent of the farms in 1930.

On farms operated by tenants either the cash or share rental system or a combination of the two is used. The share system is most popular, 59 per cent of the rented land being rented for a share of the crops in 1929. Under this system the owner usually receives two-fifths of the grain delivered to the nearest elevator and from $2 to $4 an acre for the pasture land, when all seed, labor, and machinery is furnished by the tenant. When alfalfa land is rented on shares, the owner receives one-half of the hay stacked in the field. Tenants on the better farming land, including that on the terraces and throughout the more nearly level parts of the upland, usually rent on the share basis. Under the cash system the tenant pays from $3 to $6 an acre for the land including the pasture land.

The values of individual farms vary widely, depending on the character of the soil, relief, drainage, improvements, and location with respect to markets. The farms in the northern part of the county and on the sandy land north of Logan Creek Valley have, as a rule, a lower acre value than those in the southern part.

The agricultural industries of Dixon County are closely related to the utilization of the crops. Most of the cultivable land is used for the production of feed crops including corn, oats, alfalfa, and sweetclover. The uncultivable areas are used largely for native pasture or hay land. The greater part of all crops is fed to livestock either on the farms where produced or on farms within the county. The returns derived from the sale of livestock and livestock products, therefore, are the chief sources of income in Dixon County.

The raising and fattening of cattle and hogs are the most important branches of the livestock industry, but poultry and dairy products are becoming increasingly important each year. Most of the locally raised feeder cattle are produced in the northern part of the county where the relief over large areas, especially in the Missouri River bluff lands, is unsuited to the production of tame-hay and grain crops. Cattle are fattened chiefly on the corn and alfalfa lands in the southern part of the county. Most of the animals to be fattened are shipped in as 2-year-old or 3-year-old feeders from counties to the west, although a few are purchased from ranches in the rougher parts of Dixon County. The animals are fed corn and alfalfa from 60 to 90 days and then shipped to Omaha, Sioux City, or Chicago. Some farmers fatten calves for shipment as baby beef to the near-by large markets. The calves when weaned are fed oats and later corn and alfalfa, and are shipped when between 14 and 18 months old. Only a few of the locally raised beef cattle are purebred, but most of the herds are headed by a purebred Shorthorn or Hereford bull, and all the animals are of good breeding. Most of the cattle shipped in for fattening are of Shorthorn breeding.

Each farmer raises from 20 to 60 hogs a year and a few have herds of several hundred. Oats and alfalfa form a large part of the feeding ration for breeding sows and young pigs, but corn is used chiefly in fattening the hogs for market. Practically all the hogs in the county are fattened on the farms where raised. Many are fattened in connection with the feeding of beef cattle. Numerous herds of hogs are purebred animals, and all the hogs are of good breeding, Duroc-Jersey, Poland China, and Hampshire breeds predominating. Cholera has at times disastrously affected hog raising, but the disease has been largely controlled during recent years by vaccination and increased sanitation.

Dairy products are an important source of revenue on most farms in Dixon County. Only a few farms are devoted exclusively to dairying, but from 5 to 10 cows, chiefly of mixed beef and dairy breeding, are kept on the average farm. Most farmers have cream separators and sell their dairy products to local cream stations from which they are shipped to creameries in the large cities. The abundance of oats and alfalfa to balance the corn ration and good market facilities favor the extension of the dairy industry.

Sheep raising receives little attention. A few farmers annually ship in a carload or two of sheep for fattening, but very few sheep are raised in the county. The animals are fattened on corn, oats, alfalfa, and sweetclover and are sold in the Sioux City or Omaha markets.

Poultry is a valuable asset on most farms, and includes chickens, turkeys, ducks, geese, and guinea fowls. The local demand for poultry products is good and the poultry industry is receiving increased attention. The principal breeds of chickens are Plymouth Rock, Leghorn, and Rhode Island Red.

Most farmers raise only enough horses to supply their needs. The animals are of heavy draft types, chiefly of Percheron breeding. Purebred stallions are kept on a few farms. Oats, native hay, and pasture are the chief horse feeds.

Cropping methods and practices in Dixon County are similar to those in other northeastern Nebraska counties. Corn is planted between the first and middle of May, and the greater part is planted in checkrows although some is listed in. The checkrow method requires plowing, disking, and harrowing the land prior to planting the seed. Listed corn stands drought better, requires somewhat less labor to tend it, and the stalks are less likely to lodge, which facilitates husking. Soil erosion is usually greater in listed cornfields than in those which are surface planted, particularly on rolling land, and on level land listed corn usually drowns out more easily than that which is surface planted.

The corn crop is cultivated three or four times, 2-row cultivators being commonly used. The last cultivation is usually given early in July, after which the crop is laid by and receives no further attention until harvest, except to remove the more injurious weeds by hoeing. The crop matures in September or early October, depending on the season. The greater part is husked from the standing stalks, after which cattle and horses are pastured on the fields during the winter. On farms equipped with silos from 15 to 20 acres of corn are cut each year for silage, usually with a corn binder, when the grain is in the dough stage. The corn is hauled to the silage cutter while the stalks

are green. Many farmers fence off a few acres of unhusked corn for fattening hogs and cattle, thereby saving part of the expense of husking.

Reid Yellow Dent is the leading variety of corn, although other yellow dent and some white dent varieties are grown. Most of the farmers select their own seed, either early in the fall when husking or in the winter when shelling. Some seed is shipped in, although this is not regarded as good practice because such seed usually yields less than a good type of well-adapted local seed.

One of the most important factors in determining the yield and profit from corn is soil fertility, particularly as regards organic matter and nitrogen. The Nebraska 10-acre corn-yield contest results show a very close correlation between the use of legume crops in the rotation and high yields of corn. In 1929 the 10 highest-yielding fields in the eastern Nebraska section of the contest averaged 1.8 years since they were seeded down to legumes. Their average yield was 98.4 bushels an acre. Fertility in soils which have a tendency to become depleted of their organic matter and nitrogen can be maintained by the growing of alfalfa, sweetclover, or red clover in the rotation. Many farmers in Dixon County claim that sweetclover gives the best results.

The crop rotation generally used is two years of corn, followed by one year of oats. About every 6 years, or whenever the farmer deems it necessary, a leguminous crop is grown, occupying the field for a period ranging from 2 to 8 years.

Seed-corn treatments have not proved beneficial under Nebraska soil and climatic conditions and are not generally practiced. According to Nebraska agronomists, corn smut is carried over from year to year in the fields and not on the seed; therefore seed treatment is ineffective as a control measure for this disease.

Oats ordinarily are not so profitable a crop as corn but they fit into the rotation well, and because they make a good nurse crop and very desirable feed for horses and growing livestock they are extensively grown. Oats are seldom planted on the same land two years in succession. Most of the oats grown are of the early-maturing types. The Kherson and strains of this variety, such as Nebraska 21, which is a white and high-yielding strain developed by the Nebraska Agricultural College, are most extensively grown. The land to be used for oats is usually disked, plowed, and harrowed, and the oats are sown broadcast or drilled late in March or early in April. Early seeding is recommended because of the higher yields obtained.

Oats usually mature in July, and most of the crop is cut with a binder or header, but some oats are harvested with a combine, which is a cheaper method on the larger fields. The oats are either shocked or stacked for threshing. Seed selection is not carefully practiced, the usual method being to clean a sufficient amount of seed from the previous crop. Smut sometimes lowers oat yields during prolonged periods of rainy or cloudy weather. Injury from this source, however, can be controlled by killing the smut spores on the seed before planting.[5] This may be done by sprinkling the seed, after the grain has been fanned, with a solution consisting of 1 pint of formaldehyde to 35 gallons of water.

[5] NEBRASKA UNIVERSITY, COLLEGE OF AGRICULTURE, DEPARTMENT OF AGRONONOMY AND PLANT PATHOLOGY. CEREAL SMUTS AND THEIR CONTROL. Nebr. Agr Col. Ext. Circ. 126, 8 p., illus., 1926.

Barley does not occupy a large acreage. Most of this crop is fed on farms within the county. The common 6-rowed smooth-bearded varieties are regarded as superior for Nebraska conditions and have proved more productive than the beardless varieties. The seed is sown and the crops harvested in the same manner as oats. Feeding tests show that coarsely ground barley is 90 per cent as valuable as corn in a fattening ration It is equal, if not superior, to oats as a nurse crop and is used in connection with alfalfa or clover seedings.

Wheat and rye are grown on a few farms. They are sown in the fall or spring, and the crops are harvested in the same manner as oats. Wheat is grown as a cash crop, and rye is used as hog feed or for hay and pasture.

Alfalfa is the leading hay crop. Common alfalfa from Nebraska or from regions with as severe climatic conditions as occur in this State is ordinarily grown and, on the whole, is very satisfactory. A small acreage of the Grimm and Cossack varieties is planted. Alfalfa is sown either in April or August, and thorough seed-bed preparation is important in obtaining a stand. Early plowing followed by sufficient disking, harrowing, and possibly rolling, to control weed growth and compact the soil, is desirable in most places. The best results are obtained by sowing the seed after the first heavy rain. The standard seeding rate is 15 pounds of good seed an acre, and pure certified seed should be used. Planting with a press drill usually results in higher yields than broadcasting the seed. It is not considered desirable to leave alfalfa on upland fields longer than five or six years, as the subsoil moisture becomes depleted after several seasons, and this results in low yields of hay.

Alfalfa is usually cut three times during the summer, and occasionally a fourth cutting is obtained. The common practice is to stack the hay in the field and haul it to the feed lots as needed. Most of it is fed to cattle and hogs. Many farmers run hogs on alfalfa fields during the summer, but cattle are seldom allowed to graze for long periods on green alfalfa on account of the danger of bloating.

Some wild hay is produced. This crop is largely confined to lands subject to overflow, where drainage is poor, or to slopes where erosion is severe if the native sod is broken. Most of this hay is fed to horses and cattle within the county.

The use of sweetclover has increased remarkably in the last 10 years. The plant is a biennial and dies at the end of the second year, after producing seed. Its chief use is as a soil builder, although it is used as a pasture crop and to some extent for seed and for hay. Much of the sweetclover is seeded with small grain to be plowed under in late April or early May of the following spring. This practice often increases the yield of corn by 10 or 15 bushels an acre. Sweetclover should not be more than 8 or 10 inches high when plowed under, as a heavy growth, on decomposing, dries out the soil. When hay is desired the crop is usually cut during the first year before the growth becomes coarse and weedy. The second year the crop may be allowed to mature and reseed itself, or it may be cut with a binder and threshed for seed. The permanence of a sweetclover stand depends entirely on its ability to reseed, and most farmers take care during the second year not to graze so closely as to prevent the maturity of enough of the crop to reseed the land. The most common time of seeding is in early spring, either late in March or early

in April. The seed bed is prepared in a similar manner to that required for alfalfa, and the seed is generally sown broadcast and covered with a harrow, but some seed is planted with a press drill which usually insures a more uniform stand. From 15 to 20 pounds of scarified seed are ordinarily used when seeding broadcast and about 12 pounds when a drill is used.

No commercial fertilizer is used in the county. Tests to date have failed to show profitable returns from nitrogenous or phosphatic fertilizers. Considerable barnyard manure is produced, but in general little care is taken to preserve it. On most farms the manure is piled out of doors where much of its fertilizing value is lost by leaching. The manure is hauled in the fall or spring and is generally spread on the land to be used for corn. On tenant farms little care is taken to apply the manure where it is most needed, the greater part being spread on the land near the barnyard.

## SOILS AND CROPS

Dixon County is in the prairie region of the United States, and all the soils, except those in severely eroded parts of the county or those developed on the most recently deposited stream sediments, have dark-colored topsoils, owing to an abundance of black organic matter derived from decayed grass roots. Most of the soils in the county have developed from the light-colored limy and floury loess formation; a few have weathered from sandy materials; and one has developed from a bluish-colored limy shale.

Dark-colored fine-textured soils are the most extensive and productive, and they occur over about 85 per cent of the upland, all the terrace land, and about 50 per cent of the bottom land. These soils are well supplied with organic matter, are friable throughout, have high moisture-retaining powers, and contain sufficient lime for crop needs. Practically all the area occupied by them is under cultivation.

Dark-colored coarse-textured soils occupy about 5 per cent of the land in the county, occurring chiefly in the southern part in irregular-shaped bodies throughout a narrow strip, extending from northwest to southeast in the upland north of Logan Creek. They also occupy rather large areas in the Missouri River bottom lands and are locally developed in the Logan Creek bottoms. These soils are composed largely of sand. They are low in lime and as a whole are somewhat unstable and rather droughty, but parts of the areas occurring in the bottom lands are poorly drained. The topsoils are well supplied with organic matter which assists in stabilizing the sand and in increasing the moisture-holding capacity of the soils. The organic material, however, does not entirely prevent soil drifting and, as it is confined chiefly to the surface layers, these soils do not hold sufficient moisture for optimum crop yields in dry years, especially the soils occurring in the upland. In the bottom lands good yields are obtained on the dark-colored sandy soils in all years, providing crops are grown which require an abundance of moisture. About 80 per cent of the area occupied by the dark-colored coarse-textured soils is under cultivation.

Light-colored soils occupy about 12 per cent of the land. They are most extensively developed in the severely eroded bluff-land strip

bordering the Missouri River alluvial lands in the northern and northeastern parts of the county, but they also occur in small bodies and narrow strips on the steeper valley slopes throughout all parts of the upland and on recently deposited sands in the Missouri River bottom land. The light-colored soils occurring in the upland are composed largely of light-colored limy silt, similar to that from which the dark-colored fine-textured soils have developed, but which has been so severely eroded that decayed vegetable material has not accumulated in sufficient quantities to produce soils with dark-colored surface layers. The light-colored soils occurring in the bottom lands are composed largely of loose gray sand, are low in lime, and are poorly drained in places. The greater part of the light-colored soils is either too rough or too sandy for crop production, and only about 10 per cent of the area occupied by these soils is under cultivation.

Dixon County is in the northeastern intensive meat-producing area of Nebraska.[6] The crops most extensively grown are those which are most essential in the raising and fattening of cattle and hogs. According to the Nebraska Agricultural Statistics about 70 per cent of the land area in the county was under cultivation in 1929, when corn was grown on about 58 per cent, oats on about 26 per cent, and tame hay on about 8 per cent of the cultivated land. Of the tame-hay acreage about 56 per cent was used for alfalfa and most of the remainder for sweetclover and timothy and clover mixed. Among the minor cultivated crops, barley, practically all of which is used for feed, is the most important. Very little wheat is grown, as this crop does not seem to be well adapted to the climatic conditions prevailing in the county. Winter wheat freezes out badly and spring wheat is often injured by rust and smut. In addition, wheat, not being a feed crop, does not fit in well with the general farming system, it can not be used as a nurse crop for alfalfa and sweetclover as advantageously as oats; and wheat straw has a lower feeding value than oat straw.

The land not under cultivation occupies the rougher, the more sandy, and the more poorly drained areas and is used chiefly for grazing and hay land. Range and pasture occupied 49,965 acres, and native hay 12,846 acres in 1929.

All the crops are grown on all the cultivable soils, but the relative acreage devoted to a particular crop differs somewhat on different soils. Since climatic and economic conditions operate uniformly over the county as factors in determining crop distribution, the differences in relative acreages on the different soils may be attributed to differences in the character of the soils. The soils affect crop yields, and as a result, determine, to a large extent, the type of agriculture practiced on them. This does not mean that a crop is confined to a particular soil, as it may be grown on all soils in the county; but, as a result of special adaptability to a particular soil or group of soils, it is the dominant crop on that soil or soil group.

The finer-textured dark-colored soils produce the highest yields of all crops, providing, of course, that the crop grown in a particular locality is adapted to local moisture conditions, and as these soils are by far the most extensive the relative acreages of the crops grown on

[6] HEDGES, H., and ELLIOTT, F. F. TYPES OF FARMING IN NEBRASKA. Nebr. Agr. Expt. Sta., Bul. 244; 76 p., illus. 1930.

them corresponds rather closely to the relative acreages of crops over the county as a whole. Corn occupies about 55 per cent of these soils, oats about 28 per cent, and tame hay about 12 per cent, the remaining acreage being devoted largely to sustenance crops.

The coarser-textured dark-colored soils, although topographically suited to cultivation, are rather unstable. Those in the upland are also rather droughty; are poorly suited to the formation of a firm compact seed bed so necessary for good stands of crops, especially of oats and alfalfa; and considerable danger of soil blowing exists, resulting in the exposure of the young oats and alfalfa roots to drought before they are firmly established in the ground. In the bottom lands, alfalfa does exceptionally well but oats usually produce a rank vegetal growth and a low grain yield. Corn, which is fairly well adapted to either moist or dry conditions and which is planted rather deeply, does well on the coarse-textured dark-colored soils both in the upland and bottom land. About 80 per cent of the area occupied by these soils is devoted to corn, about 12 per cent to oats, and about 3 per cent to alfalfa. Most of the remaining land is used for drought-resistant hay and forage crops, such as sweetclover, cane, and corn fodder.

The light-colored soils of the county, regardless of their texture, are used chiefly for pasture and hay land. The finer-textured ones contain an abundance of lime, have rather high moisture-retaining power, and, where topograhically suited to cultivation, are used for corn, oats, and alfalfa or sweetclover. Corn and oat yields are rather low, owing to a deficiency in the organic-matter content and, therefore, nitrogen content, of the soils, and the proportional acreages devoted to these crops is much lower than of the dark-colored fine-textured soils. Alfalfa and sweetclover do well because they are able to obtain nitrogen from the air, and, although corn and oats lead in acreage, the proportional acreage devoted to alfalfa and sweetclover is greater on these soils than on any other soils in the county. Corn is grown on about 55 per cent of the cultivable land occupied by the fine-textured light-colored soils, oats on about 25 per cent, and alfalfa or sweetclover on about 18 per cent.

From the foregoing discussion it is obvious that the texture and color of the soils are important factors in determining their agricultural values, because one or the other of these characteristics indicates the relative organic-matter content, and, therefore, nitrogen content, water-holding capacity, and stability of the different soils. Although not previously discussed, it is obvious that pronounced differences in drainage conditions and in the depth to ground water are also important factors in determining the agricultural value of the soils.

On the basis of soil characteristics and other features that affect agriculture, the soils of the county are subdivided into four broad groups, namely, dark-colored fine-textured upland and terrace soils, dark-colored coarse-textured upland soils, light-colored upland soils, and bottom-land soils. In addition, a group is established to include miscellaneous soil materials not classed as definite soil types. In the following pages the individual soils of the different groups are described in detail and their crop adaptations are discussed; the soil map accompanying this report shows the distribution of the soils in the county; and Table 5 gives their acreage and proportionate extent.

TABLE 5.—*Acreage and proportionate extent of soils mapped in Dixon County, Nebr.*

| Type of soil | Acres | Per cent | Type of soil | Acres | Per cent |
|---|---|---|---|---|---|
| Moody silt loam | 142,400 | 47.1 | Dickinson sandy loam | 12,096 | 4.0 |
| Moody silt loam, deep phase | 16,128 | 5.3 | Dickinson loamy sand | 4,224 | 1.4 |
| Moody very fine sandy loam | 23,808 | 7.9 | Dickinson fine sandy loam | 1,856 | .6 |
| Moody very fine sandy loam, deep phase | 5,312 | 1.7 | Knox silt loam | 15,744 | 5.2 |
| Moody fine sandy loam | 1,728 | .6 | Crofton silt loam | 14,976 | 5.0 |
| Waukesha silt loam | 5,056 | 1.7 | Wabash clay loam | 21,952 | 7.3 |
| Waukesha very fine sandy loam | 512 | .2 | Lamoure clay loam | 5,440 | 1.8 |
| Waukesha loamy sand | 384 | .1 | Cass clay | 2,816 | .9 |
| Waukesha loam | 192 | .1 | Sarpy fine sandy loam | 4,608 | 1.5 |
| Hall silt loam | 1,344 | .4 | Sarpy very fine sandy loam | 1,152 | .4 |
| Judson silt loam | 15,104 | 5.0 | River wash | 8,904 | 1.3 |
| Shelby loam | 64 | .1 | Dune sand | 192 | .1 |
| Boyd clay | 768 | .2 | Rough broken land | 320 | .1 |
| | | | Total | 302,080 | |

### DARK-COLORED FINE-TEXTURED UPLAND AND TERRACE SOILS

The soils of this group occupy about 75 per cent of the county. They occur throughout all parts of the loess-covered upland, where erosion is not severe, and include all the terrace soils. Their surface relief ranges from nearly level to strongly rolling, and all of them have adequate surface and subsoil drainage. The group includes the Moody, Shelby, Boyd, Hall, Waukesha, and Judson soils. Soils of the first three series named are in the upland, the Waukesha and Hall soils are on terraces, and the Judson soils occupy terracelike colluvial slopes.

The surface layers in the soils of this group are well supplied with organic matter and are very dark grayish brown or almost black. These layers are deeper and darker than those in any upland soil not belonging to the group. They range in texture from loam to clay, silt loam and very fine sandy loam predominating. Their high organic-matter content increases the water-holding capacity of these soils, assists in maintaining a uniform soil temperature, keeps the soil loose and mellow, promotes favorable tilth, retards erosion, and is the chief source of nitrogen, an important plant food which is rapidly being depleted. The subsoils of the soils in this group consist of floury silt, except in the Boyd soils where they are composed largely of clay and in the Shelby soils where they consist of heterogeneous mixtures of silt, clay, sand, and gravel. All the subsoils contain lime, but the depth of its occurrence and its abundance varies somewhat in the different soils.

The main crops of the county are grown on all the soils of this group with excellent results. Slight differences occur in the yields on different soils but these are due more to differences in surface relief, particularly the slope of the land and its elevation with respect to surrounding areas, than to differences in the soils themselves. The upland soils of the group have more sloping surfaces, as a rule, than the terrace soils and less of the rainfall sinks into the ground than on the benches. In addition, the upland soils are not so favorably situated to receive moisture from higher levels as the terrace soils and are naturally a little less productive than those soils. However, all soils of the group are more productive than any upland soil not belonging to the group and are adapted to a wider range of crops than any of the bottom-land soils in the county.

**Moody silt loam.**—Moody silt loam occupies nearly 50 per cent of the area of Dixon County. It occurs in nearly all parts of the loess-covered upland, except in the more nearly level areas, which are occupied by a deep phase of Moody silt loam, and the more severely eroded sections in which the Knox soils occur. The surface relief ranges from gently to steeply rolling, and drainage is everywhere thorough.

The topsoil in most places is very dark grayish-brown friable silt loam, well supplied with organic matter, and from 10 to 12 inches thick. In some places, especially on the steeper slopes, erosion has removed the dark-colored material giving the soil a spotted dark and light appearance, but such areas are very small, and, although nearly all the soil is subjected to some erosion, a negligible part of it has lost its dark-colored topsoil. The subsoil, which continues to an average depth of about 4 feet, is grayish-brown, light grayish-brown, or almost white mellow silt loam. It is very limy throughout and in the upper foot or two contains numerous small hard almost round lime concretions from one-fourth to three-eighths inch in diameter.

The soil as mapped includes some patches in which the topsoil is a little more sandy than typical, especially around the borders of areas joining more sandy soils, but these bodies are few and small and the soil as a whole is very uniform throughout the area of its occurrence in the county.

Practically all the land is under cultivation. It is very productive, is well adapted to all crops common to the region, and, owing to its large extent, is the most important general-farming soil in the county. In most years about 50 per cent of the land is used for corn, about 35 per cent for oats, and about 6 per cent for alfalfa. Most of the remainder is used for sweetclover, barley, wheat, clover, and mixed timothy and clover.

Crop yields on this soil are about the average for those of the county as a whole. They are a trifle lower than those obtained on the deep phases of the Moody soils and on the Waukesha and Hall soils, because the deep phases and the Waukesha and Hall soils occupy more nearly level areas where more of the precipitation sinks into the ground, and where the soils, being less subject to erosion, have developed deeper topsoils than occur in Moody silt loam. Yields, especially of corn and alfalfa, are slightly lower than on most of the bottom-land soils of the county where ground water is within reach of corn and alfalfa roots. Moody silt loam, however, gives higher yields of all crops than any of the sandy or light-colored upland soils, and higher yields of small grains than any of the bottom-land soils in the county. The average yield of corn over a period of years is about 35 bushels an acre and that of oats about 33 bushels. Alfalfa yields about 3 tons of hay an acre during the first four or five years after which yields decline, as on all upland soils, because the alfalfa roots exhaust the deep-seated moisture supply and the plant can not make optimum growth on the moisture supplied by precipitation alone.

Moody silt loam is easily handled and, if care is taken to prevent erosion on the steeper slopes, maintains its high-producing power year after year. It can be cultivated under a fairly wide range of moisture conditions. The soil forms clods if plowed when wet but these are easily reduced through subsequent tillage.

**Moody silt loam, deep phase.**—The deep phase of Moody silt loam differs from typical Moody silt loam chiefly in the greater thickness.

and higher organic-matter content of its topsoil. The deeper soil occurs on the more nearly level and usually higher divides throughout the loess-covered uplands The largest developments are in Clark and Concord Townships in the western part of the county, and the soil is only locally developed in the northern and eastern parts It is well drained but has been subjected to much erosion and has naturally accumulated more organic matter in the surface layers than typical Moody silt loam

The topsoil is from 18 to 20 inches thick in contrast to the 10 or 12 inch corresponding layer of typical Moody silt loam. The upper part of the subsoil is light brown and the lower part is gray. Both topsoil and subsoil are friable and highly retentive of moisture. Lime lies at a much greater depth than in typical Moody silt loam, being 6 feet below the surface of the ground, but no part of the soil profile seems to be deficient in lime so far as crop needs are concerned.

This is one of the strongest and most productive soils of the upland. The same crops in about the same acreage ratios are grown on it as on typical Moody silt loam, and crop yields average about 5 per cent higher than on that soil. Soil of the deep phase is much less extensive than typical Moody silt loam and is therefore not of great agricultural importance in Dixon County.

**Moody very fine sandy loam.**—Moody very fine sandy loam differs from Moody silt loam only in that it contains a little more very fine sand in its topsoil. The sand content, although sufficient to make the soil a little more easily handled than Moody silt loam, does not increase its producing power over that of the silt loam, and the two soils are used for the same crops in about the same acreage ratios.

This soil is much less extensive than Moody silt loam. Practically all of it occurs in Clark, Daily, and Hooker Townships in the western part of the county, where it occupies gently or strongly rolling areas. Nearly all the land is under cultivation.

**Moody very fine sandy loam, deep phase.**—The deep phase of Moody very fine sandy loam differs from the deep phase of Moody silt loam only in the slightly higher content of very fine sand in its topsoil. It is used for the same crops as Moody silt loam and Moody very fine sandy loam, and crop yields are about the same as those obtained on the deep phase of Moody silt loam.

Practically all the land is under cultivation. This is regarded as one of the strongest upland soils in the region, but as it does not occupy a large total area it is of little agricultural importance. Most of the soil of this phase occurs in the western part of the county in close association with the deep phase of Moody silt loam which it resembles both in surface relief and adaptability to crops. In fact, the farmers recognize no differences between the deep phases of Moody silt loam and Moody very fine sandy loam in crop yields, crop adaptabilities, or tillage requirements, and the deep phases of both soils are regarded as superior to the typical soils, especially in their producing powers.

**Moody fine sandy loam.**—Moody fine sandy loam is the most sandy of the Moody soils in Dixon County. The sand, however, occurs only in the topsoil and is not sufficiently abundant to make the material unstable or droughty. It is intimately mixed with an abundance

of silt and organic matter and the topsoil, which is very dark, averages about 12 inches in thickness. The subsoil is similar in all characteristics to the subsoil of Moody silt loam.

Moody fine sandy loam is well adapted to all crops common to the region, and although it is not quite so productive as the deep phases of the Moody soils, it produces as high yields as are obtained on typical Moody silt loam or Moody very fine sandy loam. In addition, it can be cultivated under almost any moisture conditions without injury, owing to its high sand content It occupies less than 3 square miles and is therefore of little agricultural importance. Areas of this soil occur chiefly in the western part of the county.

**Waukesha silt loam.**—Waukesha silt loam occupies 70 per cent of the terrace land About half of it is on the terraces along South Creek, and most of the remainder is in the valley of Logan Creek north of Wakefield Its total area is 7.9 square miles.

This soil has developed from silt similar in character to the upland loess which underlies the Moody soils but which was carried to its present position and deposited as sediment by streams when they were flowing at higher levels The surface relief is nearly level or gently undulating. The land lies from 8 to 15 feet above the present bottom lands, and all the soil is well drained

The topsoil is granular friable silt loam, from 16 to 20 inches thick, well supplied with organic matter, and very dark. The upper part of the subsoil is brown or grayish-brown silt loam which is a little more compact than the topsoil but friable throughout. The lower part of the subsoil, beginning at a depth of about 45 inches, is light-gray floury silt. Neither the soil nor the subsoil contains sufficient lime to effervesce when dilute hydrochloric acid is applied, although the parent loess is very limy below a depth ranging from 70 to 80 inches. The soil is very uniform thoughout the area of its occurrence, and is very retentive of moisture.

Waukesha silt loam is well adapted to all crops common to the region and is one of the most productive of the general-farming soils in the county. It receives more moisture from the higher levels than any of the upland soils, and this together with the moisture received through precipitation gives it a somewhat higher producing power than any of the Moody soils.

Practically all the land is under cultivation About 65 per cent is devoted to corn, about 20 per cent to oats, about 10 per cent to alfalfa, and the remainder is used for barley, wheat, sweetclover, potatoes, and other crops grown for sustenance and feed The average yield of both corn and oats is about 40 bushels an acre and that of alfalfa about 3¼ tons.

The soil is easily handled, and owing to its nearly level surface and high producing power is preferred to any of the upland soils for general farming, but it is of minor agricultural importance on account of its small extent.

**Waukesha very fine sandy loam.**—Waukesha very fine sandy loam occupies less than 600 acres. It occurs in several small bodies on low terraces chiefly in the valley of Logan Creek The soil resembles Waukesha silt loam in all characteristics except the texture of its topsoil. This layer of the very fine sandy loam contains a little more sand than does the silt loam.

All of this soil is under cultivation. It is used for the same crops, in about the same acreage ratios, and has about the same producing power as Waukesha silt loam.

**Waukesha loamy sand.**—Waukesha loamy sand occupies about 400 acres. It occurs in a few small bodies on the terraces in the valley of Logan Creek The largest area, comprising about 160 acres, is southeast of Concord on the south side of the valley. The surface of the soil is nearly level or very gently undulating. It lies from 10 to 15 feet above the adjoining bottom lands, and the soil is well drained.

The topsoil is dark grayish-brown loamy sand about 10 inches thick. It rests on a slightly lighter-colored, less sandy, and more silty upper subsoil layer which gives way at a depth of about 20 inches to gray incoherent sand. The soil does not contain sufficient lime to produce noticeable effervesence when acid is applied.

Were it not for the high silt content of the upper subsoil layer this soil would be classed as O'Neill loamy sand. However, it is more stable than most of the O'Neill soils as mapped in other counties of Nebraska, and owing to its rather silty upper subsoil layer it is more retentive of moisture. For these reasons it is included with the Waukesha soils on the soil map

All the land is under cultivation, chiefly to corn. Some oats and alfalfa are grown, but these crops are much less important on this soil than on the finer-textured terrace soils of the county, chiefly on account of the difficulty of obtaining a firm compact seed bed so necessary for good stands of oats and alfalfa. The soil is a little more droughty than Waukesha silt loam and Waukesha very fine sandy loam, and all crops yield about 20 per cent lower than on those soils, especially in dry seasons.

**Waukesha loam.**—The soil classed as Waukesha loam in Dixon County occupies a single body, including 192 acres, on the Dixon-Thurston county line 1½ miles east of Wakefield. The surface relief is nearly level. This soil lies from 12 to 14 feet above the adjoining bottom lands and is well drained.

The topsoil is very dark grayish-brown loam about 12 inches thick. It is fairly well supplied with organic matter which accounts for its dark color. The upper part of the subsoil, which continues to a depth of about 20 inches, is brown friable loam. The remainder of the soil to a depth exceeding 5 feet consists of light-brown sandy loam or sandy clay loam. According to field tests the soil is low in lime, but it seems to contain sufficient for all crop needs.

The principal variation in the soil is in the texture of its topsoil which in spots may contain more or less sand than typical. However, no part of the soil is so sandy as to be droughty or unstable.

All the land is under cultivation. The soil has about the same producing power as Waukesha silt loam and Waukesha very fine sandy loam and is used for the same crops in about the same acreage ratios as are those soils

**Hall silt loam.**—Hall silt loam ranks next in area to Waukesha silt loam among the terrace soils. It occupies about 2 square miles, occurring in bodies of various sizes chiefly on the terraces in the valley of Logan Creek. The largest area, comprising about 400 acres, is 1 mile northwest of Wakefield. A few small bodies are on the terraces along Lime Creek north of Maskell.

The surface relief and drainage conditions on this soil are similar to those on Waukesha silt loam, and both soils occupy comparable terrace levels Hall silt loam is similar to Waukesha silt loam in all soil characteristics except that the lower part of the subsoil of Hall silt loam contains an abundance of finely divided lime whereas the corresponding layer in Waukesha silt loam is very low in lime. The soil is used for the same crops as Waukesha silt loam and has about the same producing power as that soil.

**Judson silt loam.**—Judson silt loam occurs in narrow broken strips on the valley floors along several of the drainage ways in the county. The widest strips are along Lime Creek north of Maskell and along Aowa Creek, near its mouth, where in places the strips attain a width of more than one-fourth mile. Elsewhere the strips in few places exceed one-eighth mile in width, and many of them are only a few rods wide.

The soil lies from 8 to 12 feet above the stream channels and is well drained. Its surface slopes gently down the valley and toward the streams. It has developed over a mixture of fine sediments derived through surface wash and colluvial action from the soils of the upland and deposited within the narrow stream valleys. The most striking characteristic of this soil is its uniformity to a depth of 5 or 6 feet. It consists of very dark grayish-brown mellow silt loam which continues with little change throughout the entire soil, though the surface layer to a depth of 6 or 8 inches may be slightly darker than the remainder of the soil owing to a larger organic-matter content. The soil is rich in well-decomposed plant remains and although rather low in lime is not deficient in this material.

**Shelby loam.**—Shelby loam occupies 64 acres. It occurs in several small bodies, chiefly in Daily Township in the western part, the largest, comprising about 40 acres, being in sections 29 and 30. A small area is south of Waterbury in Otter Creek Township.

This soil is mapped only where erosion has removed the gray upland loess and exposed the underlying glacial drift to weathering, and most of the bodies occur on the lower slopes of rather deeply intrenched valleys. The drift consists of a brown or reddish-brown heterogeneous mixture composed largely of silt and clay, together with considerable sand, some gravel, and a few bowlders.

The topsoil, except in local spots where erosion has kept the drift exposed, is very dark grayish-brown friable loam ranging from 8 to 12 inches in thickness The upper 8 or 10 inches of the subsoil ranges from brown loam to gravelly loam and, although slightly more compact than the topsoil, is friable throughout. The lower part of the subsoil is a brown silt, sand, clay, and gravel mixture resembling the parent drift.

This soil is variable from place to place. In most places the topsoil and upper subsoil layers have received much material from the surrounding loessial areas. In a few places, the topsoil is covered, to a depth ranging from 6 inches to 2 feet, by dark silt loam or very fine sandy loam washed from the surface layers of the Moody soils, and in many places the upper subsoil layer greatly resembles the corresponding layer in Moody silt loam, even containing the hard round white lime concretions so characteristic of that soil. All the Shelby loam contains more or less gravel in its upper layers and most of it is rather low in lime to a depth below 3 or 4 feet.

About 50 per cent of the land is under cultivation, and the remainder, including the steeper slopes and areas in which the sand and gravel are so abundant as to make the soil droughty, is used for pasture land. The cultivated land is used for the same crops in about the same acreage ratios as Moody silt loam. Yields average about 20 per cent lower than on Moody silt loam and in dry years are only about half as large, chiefly on account of the low moisture-retaining power of the gravelly subsoil.

**Boyd clay.**—Boyd clay is mapped wherever erosion has cut through both the gray loess and glacial drift and exposed the bluish-colored limy shale to weathering. This soil is of very small extent, the total area not exceeding 800 acres. Most of it is on the lower slopes in the bluff lands along Missouri River. One of the largest bodies, comprising about 160 acres, is about 4 miles northeast of Newcastle.

The topsoil, except where erosion has been especially severe, is very dark grayish-brown, in many places almost black, clay or clay loam well supplied with organic matter and from 8 to 10 inches thick. This layer rests directly on the parent bluish-colored shale in which occurs an intricate network of seams and cracks of different widths filled with finely divided lime.

Considering its heavy texture, the soil is remarkably friable and porous, owing partly to the manner in which the lime is distributed and partly to the addition of silty material which has been washed down from the higher-lying loessial soils and has become mixed with the clay and shale. The soil is much darker and more limy and friable than any of the Pierre soils in northwestern Nebraska. About 50 per cent of this soil in Dixon County is under cultivation and is used for the same crops as are grown on the Moody soils. The uncultivated parts occur chiefly on the steeper slopes and are used for pasture land. In normal and wet years crop yields are almost as high as on Moody silt loam, but in dry years yields are usually low because the high clay content causes the soil to shrink and crack badly, thereby breaking the crop roots and exposing them to drought.

### DARK-COLORED COARSE-TEXTURED UPLAND SOILS

The soils classed in this group occupy a combined area of 28.4 square miles. They occur chiefly on the broad rolling divide between Logan Creek and the headwaters of South Creek. Only three soils are included in the group, Dickinson sandy loam, Dickinson loamy sand, and Dickinson fine sandy loam. These soils have developed from gray incoherent sand which was exposed to weathering through the removal of the light-colored upland loess. The surface layer of the sandy deposit has become mixed with considerable silt washed in from loessial areas, together with organic matter derived from decayed grass roots, and the material is fairly stable. However, none of the soils belonging to the group contains sufficient silt and organic matter to entirely prevent soil drifting, and all of them have lower moisture-retaining powers than the soils of the dark-colored fine-textured group.

The surface soils range in texture from fine sandy loam to loamy sand and are not quite so dark as the corresponding layers in the Moody soils but are fairly well supplied with organic matter. The

subsoils consist largely of gray or grayish-brown sand but in most places contain enough silt to render the sandy material somewhat coherent. These soils are used chiefly for corn, and sweetclover and rye, although of minor importance, are grown more extensively on all soils of the group than on those of any other group in the county.

**Dickinson sandy loam.**—Dickinson sandy loam is the most extensive soil in this group, although its total area does not exceed 19 square miles. Its topsoil is dark grayish-brown sandy loam or loamy fine sand, ranging from 8 to 12 inches in thickness, which contains a moderate amount of organic matter and some silt, and, although fairly stable, is not so firm as the topsoil of the Moody soils. The soil material is subject to a little drifting during prolonged periods of dry windy weather, especially if not protected by vegetation. The subsoil is grayish-brown or light grayish-brown loamy fine sand containing very little organic matter but being fairly well supplied with silt which loosely binds the sand grains together. This material extends to a depth exceeding 5 feet with little change. Both surface soil and subsoil have been leached of lime.

The soil is porous and can absorb large amounts of water. It is not so retentive of moisture as the Moody soils, but crops on it are able to endure short droughts very well. Practically all the land is under cultivation, about 80 per cent of it being used for corn, about 10 per cent for oats, and most of the remainder for sweetclover and rye.

Corn in wet years yields almost as high as on the Moody soils, but in dry seasons the yields are considerably lower. Oats do well even in fairly dry seasons providing a good stand is obtained, but the difficulty in obtaining a good stand has greatly curtailed the use of the soil for the production of oats. Rye and sweetclover both seem well adapted to the soil and do well in most years. However, all crops produce lower yields than on the more silty soils of the uplands. The average yield of corn over a period of years is about 25 bushels an acre, of oats about 23 bushels, and of rye about 15 bushels. Most of the sweetclover is used for pasturing hogs and cattle.

The soil is easily handled and can be cultivated under almost any moisture conditions without injury. It warms up rapidly in the spring, and seed can be planted about a week earlier than on the heavier soils of the county.

**Dickinson loamy sand.**—Dickinson loamy sand differs from Dickinson sandy loam only in that it has a lower organic matter and silt content in the topsoil. It occurs in numerous bodies, most of which are closely associated with bodies of Dickinson sandy loam. The total area of the soil is 6.6 square miles.

The topsoil, although dark colored and from 8 to 10 inches thick in most places, is rather unstable, and the soil as mapped includes several spots from which the wind has blown most of the organic matter and silt, exposing the gray incoherent sand of which the soil is so largely composed.

Although about 90 per cent of this soil is under cultivation and used for the same crops as are grown on Dickinson sandy loam, the yields range from 15 to 20 per cent below those obtained on the sandy loam. In dry windy seasons oat yields are especially low on account of the tendency of the sand to shift and expose the shallow roots to drought.

**Dickinson fine sandy loam.**—Dickinson fine sandy loam is more stable and more retentive of moisture than any of the other Dickinson soils in the county. It is well adapted to all crops common to the region and, although a little less productive than the Moody soils, produces higher yields than any other Dickinson soil. It occupies small bodies having a combined area of only about 3 square miles, and it is of little agricultural importance.

The topsoil is better supplied with silt and organic matter and averages a little darker and deeper than the topsoil of Dickinson sandy loam, being in most places very dark grayish-brown fine sandy loam about 14 inches thick. The subsoil is gray fine sandy loam or very fine sandy loam. The entire soil is low in lime.

Practically all the land is under cultivation. It is almost as retentive of moisture as the Moody soils, and crops on it seem to withstand short droughts as well as on any upland soil in the county, but during prolonged dry spells crops suffer a little more from lack of moisture than on the more silty upland soils.

### LIGHT-COLORED UPLAND SOILS

The light-colored upland soils comprise more than 10 per cent of the total area of the county. These soils are most extensively developed in the severely eroded bluff-land areas bordering Missouri River in the northern part of the county, but they also occupy narrow sinuous strips and small irregular-shaped areas on the sharper divides and steeper slopes throughout the loess-covered uplands. About 20 per cent of the total area of these soils, mainly on the gradual slopes, is under cultivation. Corn occupies about 90 per cent of the cultivated land, and the remainder is, for the most part, in alfalfa and sweetclover. All of the area of these soils except cultivated fields and narrow forested strips occupying stream valleys is covered with nutritious grasses, chiefly bluestem and grama, and will support from 90 to 100 head of cattle on each 160 acres.

**Knox silt loam.**—Knox silt loam is the most severely eroded of the silty upland soils. It occurs in the bluff-land areas bordering Missouri River where erosion has removed the topsoil and the upper part of the subsoil including the layer in which concretionary lime occurs in other soils in this region. The rapid run-off of precipitation has prevented deep leaching of the soil material so that the limy parent silt is at, or within, a few inches of the surface and the soil throughout is very light colored.

The surface soil consists of grayish-brown or light grayish-brown loose mellow silt loam. It is underlain at a depth of 6 or 8 inches by loose light grayish-yellow or almost white silty parent material similar to that from which the Moody and Crofton soils have developed. Lime is abundant from the surface downward, occurring chiefly in the finely divided form.

Knox silt loam differs from the Moody and the Crofton soils in that its topsoil is thinner and lighter colored and hard lime concretions do not occur in its subsoil. If either the Moody or the Crofton soils on slopes are neglected and erosion is allowed to proceed unhindered, these soils will be replaced by Knox soils.

Knox silt loam is better adapted to grass than to a cultivated crop, as the grass tends to check erosion. The greater part of this soil is

in virgin sod and should remain in this state. A few small areas are cultivated, but yields are only from one-third to one-half as large as on Moody silt loam. A larger proportion of oats than corn is planted, as fields seeded to oats are less subject to erosion than those planted to corn. Knox silt loam is a strong fruit soil, being well adapted to apples, grapes, and blackberries. Fruit, however, is not grown on a commercial scale in Dixon County owing to the danger of the late spring frosts.

**Crofton silt loam.**—Crofton silt loam is intermediate in stage of development between Moody silt loam and Knox silt loam. Erosion has been sufficiently rapid and continuous to remove the dark-colored topsoil characteristic of Moody silt loam but has not removed the concretionary lime layer of the subsoil as in Knox silt loam.

The topsoil, in most places, consists of a 6 or 8 inch layer of very dark grayish-brown mellow silt loam. This is underlain by a 12-inch layer of light grayish-brown friable silt containing numerous hard lime concretions, similar to those in the upper subsoil layer of the Moody soils. Beneath the concretionary layer is the parent material, consisting of loose grayish-yellow or almost white silt which continues to a depth ranging from 12 to 15 feet. The parent material contains a large amount of lime but only a few lime concretions.

Owing to its unfavorable relief, a large part of Crofton silt loam is not well suited to crop production, and probably not more than 25 per cent is under cultivation in Dixon County. The pasture land supports a luxuriant grass cover. On the comparatively small cultivated areas corn and alfalfa are the principal crops. Alfalfa yields are about the same as those from Moody silt loam but the average yield of corn is about 10 per cent lower.

### BOTTOM-LAND SOILS

The soils classed in the bottom-land group occupy 56.2 square miles. The group includes all the Wabash, Lamoure, Cass, and Sarpy soils. These soils occupy first-bottom or flood-plain positions in the larger valleys. They have developed from sediments deposited in the stream bottoms during periods of high water. The largest developments are along Missouri River and Logan Creek where the bottoms are more than a mile wide in many places. The Wabash and Lamoure soils have developed from the finer-textured more silty sediments, and the Cass and Sarpy soils have weathered from coarse-textured sands and gravels.

The surface relief of the flood plains is nearly level, except where traversed by old and present stream channels or modified by slight elevations or shallow depressions. Local areas are subject to overflow from the main streams, but water seldom remains on the surface of the ground longer than a few hours. Much of the Logan Creek bottom land was formerly very wet the greater part of each year, but drainage conditions have been greatly improved by artificially straightening and deepening the creek channel, and at present only a small percentage of the bottom-land soils in the county are too poorly drained for cultivated crops. The underlying water table ranges from about 4 to 15 feet beneath the surface of the ground, and the subsoils are kept well supplied with moisture except in the driest years.

The moist conditions prevailing in the bottom lands have favored rapid vegetative growth and decay, and all the soils except the Sarpy, which have developed from the most recently deposited sands, have dark-colored topsoils owing to an abundance of black organic matter.

The bottom-land soils, except in local poorly drained spots and in areas occupied by the Sarpy soils, are especially well adapted to corn and alfalfa and as a whole give higher yields of these crops than are obtained on the best upland and terrace soils of the county. About 80 per cent of the area occupied by them is in corn, about 15 per cent in alfalfa, and most of the remainder, including the more poorly drained parts, is used for native hay and pasture. Some oats are grown, but, owing to the abundant moisture supply, this crop usually produces excessive vegetative growth at the expense of the grain, and yields are lower than on the more elevated and less moist soils of the county.

**Wabash clay loam.**—Wabash clay loam is the most extensive bottom-land soil. It occurs chiefly in the valleys of Logan and South Logan Creeks, and is the most extensive soil along Aowa Creek. The surface is nearly level except where modified by stream channels. Drainage is good except locally in Logan Creek Valley.

The topsoil is very dark grayish-brown or almost black heavy and rather compact clay loam from 18 to 24 inches thick, well supplied with organic matter. The subsoil, which continues to an average depth of 4 feet, is similar in texture to the topsoil but is a little lighter in color and slightly more compact. It does not attain the density of a claypan and is easily penetrated by moisture and roots. Neither the topsoil nor the subsoil shows any lime in ordinary field tests, but the soil does not seem to be deficient in lime so far as crop needs are concerned.

About 75 per cent of the land is under cultivation, and the remainder, included in narrow forested strips along some of the stream channels and in a few poorly drained areas in the vicinity of Wakefield, is used largely for pasture and hay land This soil, where suited to cultivation, is one of the most productive corn and alfalfa soils in the county. Corn occupies about 80 per cent of the cultivated land, and alfalfa most of the remainder. The average yield of corn over a period of years is about 45 bushels an acre, and of alfalfa about 3½ tons. The native grasses on the uncultivable parts of the soil will support a cow or horse on each acre during the summer grazing season, or, when cut for hay, will yield about 1 ton an acre. Alfalfa can be grown on the cultivable areas as often as desired without a noticeable decrease in yields because there is little danger of depleting the subsoil moisture to the point where yields of this crop decline. The soil is rather poorly adapted to small grains, chiefly on account of its abundant moisture supply. A few fields of oats are grown, but this crop usually makes an extremely rank vegetative growth and a low grain yield.

Owing to its high clay content, the soil is difficult to handle, and the range of moisture conditions under which favorable tilth can be maintained is rather narrow. If plowed when wet, hard clods are formed, which require subsequent wetting and drying or freezing and thawing before granulation is restored. It is almost impossible to plow the soil when it is dry. Even under favorable moisture conditions more power is required to till this soil than any of the more

silty and less clayey soils of the county, but the high producing power of Wabash clay loam tends in a large measure to compensate for the extra labor required in handling it.

**Lamoure clay loam.**—Lamoure clay loam ranks next in area to Wabash clay loam among the bottom-land soils. It occurs along Logan Creek and one of its larger tributaries. The soil as a whole is not quite so well drained as Wabash clay loam In local spots it contains alkali in sufficient quantities to injure tame-hay and grain crops, but about 65 per cent of it is sufficiently well drained and free from alkali for cultivation.

The topsoil of this soil is similar to that of Wabash clay loam in all characteristics, and the subsoil resembles the corresponding layer of Wabash clay loam in texture and compaction, but is more variable in color and has a much higher lime content. The subsoil ranges from gray to almost black in color, but in most places has a mottled gray, brown, and white appearance. Lime, which is largely responsible for the lighter colors, occurs in rounded soft and hard concretions and in numerous irregular-shaped spots and splotches.

The same crops in about the same acreage ratios are grown on the cultivated areas of this soil as on those of Wabash clay loam, and crop yields are about the same as on that soil. In fact, the farmers recognize no difference between Lamoure clay loam and Wabash clay loam in crop adaptabilities or producing powers, providing the soils are equally well drained. The more poorly drained and more alkaline parts of Lamoure clay loam are used for pasture and hay land, for which they are as well suited as the poorly drained parts of Wabash clay loam.

**Cass clay.**—Cass clay occupies 4.4 square miles, occurring in several bodies in the Missouri River bottom lands.

This soil has developed from two layers of river-deposited sediment, the lower layer consisting largely of fine sand or medium sand, and the upper layer of clay. The upper layer has been stationary long enough to have accumulated considerable organic matter. The surface relief is nearly level, but the slope is sufficient to afford adequate surface drainage, and all the soil has good underdrainage.

The topsoil is dark grayish-brown rather compact clay or silty clay 6 or 8 inches thick. It is sticky and plastic when wet and hard and tough when dry, but under average moisture conditions is very loose and mellow. The upper part of the subsoil, which extends to an average depth of about 16 inches, is similar in texture to the topsoil but is considerably lighter and more variable in color. In most places it is rather uniformly grayish brown, but in many localities the color is modified by poorly defined light-gray spots, splotches, and streaks. The lower part of the subsoil consists of gray fine sand or medium sand, which in most places becomes coarser in texture with depth, and in many places is gravelly below a depth of 3 feet. The soil is faintly limy throughout.

Practically all the land is under cultivation. It ranks among the most productive corn and alfalfa soils. About 80 per cent of it is used for corn and most of the remainder for alfalfa. Small grains grow well, but as they usually produce a rank vegetal growth and low grain yields they are seldom planted on this soil.

This soil is not quite so well supplied with organic matter as the Wabash and Lamoure soils, as is indicated by the slightly lighter

color of the topsoil. It is a little less productive, especially of corn, than those soils, but corn yields on it are higher than on any of the terrace or upland soils of the county, and the yields of alfalfa obtained on it are not exceeded on any soil.

Although Cass clay is admirably suited to alfalfa and corn, it is rather difficult to handle, being similar in this respect to Wabash clay loam. It can not be profitably cultivated for several days after heavy rains or when the soil becomes extremely dry, but under normal moisture conditions it is easily maintained in good tilth.

Included with this soil on the accompanying map is a small body of Cass clay loam and two small bodies of Cass loam. The clay loam body occupies about 10 acres and occurs along the Cedar-Dixon County line 4 miles northwest of Maskell. The soil in this body is identical in all characteristics to Cass clay except that it contains a little more sand in the topsoil and is, therefore, more easily handled. The two bodies of Cass loam are in the southeastern and northeastern parts of sections 28 and 34, respectively, T. 27 N., R. 5 E., and have a combined area of about 160 acres. In these bodies the topsoil is very dark grayish-brown friable loam or silt loam, well supplied with organic matter, but it is only about 6 inches thick. It rests on gray or grayish-brown loose incoherent sand which continues with little change to a depth below 4 feet. The soil is low in lime and rather droughty, and is practically all included in pasture land.

**Sarpy fine sandy loam.**—Sarpy fine sandy loam occupies only four bodies, with a combined area of 7.2 square miles. All of them are adjacent to the Missouri River channel. This soil has developed from sandy sediments which were recently deposited in the river bottom during periods of high water. The surface relief is nearly level, although it is locally modified by old and present stream channels, slight elevations, and shallow depressions. Practically all the soil is subject to occasional overflow.

The topsoil consists of gray or grayish-brown incoherent fine sand or medium sand to a depth ranging from 8 to 10 inches. It is underlain to a depth exceeding 5 feet by slightly lighter-colored and coarser-textured sand. The 1 or 2 inch surface layer of the topsoil usually contains considerable organic matter and in many places is much darker than the rest of the soil. The organic-matter content, however, is insufficient to prevent soil drifting when the natural vegetation is destroyed, and it rapidly disappears if the land is overgrazed or brought under cultivation. In few places is the soil limy. The principal variation in this soil is in the texture of the topsoil which in many places contains more silt than is typical, and locally patches occur in which the texture is silt loam, but these patches are too small to show on a map of the scale used in this survey.

Practically all the soil is included in pasture land. Some corn is grown but the yield is low, except in the most favorable years. The native grasses are sparse, and the land does not have a high value even for grazing. Much of it supports a stunted tree growth.

**Sarpy very fine sandy loam.**—Sarpy very fine sandy loam occupies only a few small bodies, all of which are in the Missouri River bottom lands. The largest, comprising about 600 acres, is 7 miles north of Ponca. The total area of the soil in this county does not exceed 1,200 acres. The surface relief ranges from nearly level to gently

undulating. The soil lies from 6 to 7 feet above normal stream level, is well drained, and is not subject to overflow.

Sarpy very fine sandy loam differs from Sarpy fine sandy loam in that it is composed of a finer grade of sand, has a thicker and darker topsoil, and is more stable. However, the soil is very low in organic matter and light in color even on the surface. It is better suited to cultivation than Sarpy fine sandy loam. It is poorly adapted to small grains on account of its high moisture content but it is fairly well suited to corn and alfalfa. About 40 per cent of the land is used for corn, about 10 per cent for alfalfa, and the remainder is included in pasture land. Corn yields are below those obtained on the Lamoure and Wabash soils on account of the lower organic-matter content of this soil, but they average about 25 bushels an acre. The yields of alfalfa are almost as high as on the finer-textured bottom-land soils, probably because this crop does not depend on organic matter for its nitrogen supply. The native pasture on this soil will support a cow or a horse on each 1 or 2 acres during the summer grazing season.

### MISCELLANEOUS MATERIALS

This group includes areas of dune sand, rough broken land, and river wash, none of which can be satisfactorily classed in any soil group. These materials have a combined area of 6.9 square miles. They are not suited to cultivation, but all of them have some value for grazing purposes.

**River wash.**—River wash is the most extensive of the miscellaneous materials and occupies five bodies with a combined area of about 6 square miles. One of the largest bodies is north of Vermilion Ferry. The material consists of sand bars and mud flats adjacent to the channel of Missouri River. It lies only a few feet above the normal level of the river channel and is flooded with each slight rise of the stream. Even during normal flow small areas are shifted about, added to, or carried away by the varying currents. The material drifts easily, and during dry windy weather is shifted about to a considerable extent by the wind. It represents the first stages of alluvial soil formation, and, with the general accumulation of organic matter under undisturbed weathering, will develop into Sarpy soil. River wash as a whole is regarded as waste land, although most of it supports a fairly dense growth of young willow and cottonwood trees, some of which are suitable for posts and fuel.

**Dune sand.**—Dune sand occurs chiefly within areas of Dickinson loamy sand in the central part of the county. The bodies are small, and their total area does not exceed 200 acres. One of the largest areas, comprising about 50 acres, is south of Daily Branch in Daily Township. The material occurs where the wind has removed the organic matter from Dickinson loamy sand and whipped the loose gray sand into a series of low mounds and ridges. The bodies are developed only in localities where excessive grazing has destroyed the vegetative covering and allowed the wind to act directly on the surface of the ground. Dune sand areas are practically devoid of vegetation and as developed in this county are regarded as waste land.

**Rough broken land.**—Rough broken land occupies narrow strips on the steep bluffs bordering the Missouri River Valley in the northern part of the county. The surface is dissected by deep vertical-walled gullies or ravines, and outcrops of shale, limestone, or sandstone occur

in many places. The land has a low grazing value. Most of it supports a forest cover consisting of bur oak, elm, ash, hackberry, and boxelder trees. The trees are not of merchantable size but are of value for fuel and posts. The total area of rough broken land is one-half square mile.

## SOILS AND THEIR INTERPRETATION

The soils of Dixon County, with few exceptions, have developed under a grassy vegetation and form the uniformly light-colored floury and limy silt of the Peorian loess. They have also developed under a temperate, subhumid climate which has favored rapid decay of the dead grass remains. All the soils, except those on the steeper hillsides or on recently exposed or deposited sand, have accumulated enough black organic matter from decayed grass roots to make their surface layers very dark. These dark layers are moderately granular or crumblike, especially in the finer-textured soils. The mean annual precipitation of 28.63 inches has not been sufficient to leach the readily soluble salts from the entire soil, except in the more sandy areas and in some areas which are favorably situated to receive run-off from higher levels. Throughout most of the county the easily soluble salts, chiefly lime carbonate, have been leached only from the upper part of the soil and have accumulated in the lower part, producing a layer of higher lime content than occurs in any other part of the soil profile or in the parent soil material. This layer is commonly known as the lime zone. In addition to the dark surface layer and the lime zone layer, the more extensive soils of the county have developed layers, or horizons, all of which lie parallel to the surface of the ground, occur in a definite sequence from top to bottom, and differ from one another in some important characteristic, such as color, texture, structure, chemical composition, or compaction.

The number of layers in a particular soil, as well as the stage of development attained by them, depends largely on the surface relief and drainage conditions under which the soil has developed and on the character of the geologic materials from which it has weathered. As a rule, the layers are most pronounced and numerous in those soils which have been least affected by erosion and which have lain in their present positions for the longest periods of time They are also more pronounced and numerous in the well-drained than in the poorly drained soils and in soils which have developed from loess than in those from sandy or clayey formations, providing comparisons are made on comparable surface relief.

Throughout the upland the soils mapped as deep phases of the Moody soils have reached the most advanced stage of development. These phases occur only on the more nearly level and higher-lying loess-covered divides. They have apparently developed under good but not excessive drainage and have probably lain in their present positions, practically undisturbed by erosion, longer than any other soil in the county.

The following description of the profile of Moody silt loam, deep phase, observed in sec. 30, T. 27 N., R. 4 E., is regarded as fairly typical of these soils.

From 0 to 10 inches, the soil is very dark grayish-brown or almost black friable silt loam, in which the material is granular below a depth of about 2 inches. The granules are small, irregular in shape, and

rather poorly defined. From 10 to 18 inches is dark grayish-brown granular silty clay loam, in which the granules are about one-fourth inch in diameter and well defined but very soft. From 18 to 25 inches is grayish-brown granular heavy silty clay loam, in which the granules are slightly larger and firmer than in the layer above and the layer is a little more compact than either of the two overlying layers, but it is very friable throughout. The color is a trifle lighter in the lower part than in the upper part of this layer. From 25 to 70 inches, the material is very light grayish-brown friable structureless silt or silt loam containing a few rust-brown spots and specks. This layer showed no lime reaction in the field test. The material has a faintly developed columnar form. From 70 to 102 inches is light yellowish-brown floury structureless silt with a well-developed columnar form. This layer is calcareous throughout, the lime occurring as hard rounded concretions about one-eighth inch in diameter and in finely divided form. The concretions occur mainly in the upper 14 inches of the layer.

The organic-matter content decreases gradually with depth. To a depth of 4 or 5 inches from the surface it appears to be evenly distributed throughout the soil mass, but in the lower layers it occurs chiefly as a film or coating on the surfaces of the structure particles and practically disappears about 40 inches below the surface of the ground. Downward percolating waters have carried most of the lime to a depth below 7 feet. Although this depth to lime is common in all deep phases of the Moody soils in Dixon County it is much greater than in any of the more rolling loess-derived soils of the upland for the obvious reason that more of the rainfall sinks into the soil on the nearly level than on the less even surfaces. Whether or not the phases have a zone of lime enrichment has not been determined, but if they have, this zone must be below a depth of 7 or 8 feet.

Table 6 gives the mechanical analyses of the different soil layers of Moody silt loam, deep phase.

TABLE 6.—*Mechanical analyses of Moody silt loam, deep phase*[1]

| Depth | Fine gravel | Coarse sand | Medium sand | Fine sand | Very fine sand | Silt | Clay |
|---|---|---|---|---|---|---|---|
| | *Per cent* | *Per cent* | *Per cent* | *Per cent* | *Per cent* | *Per cent* | *Per cent* |
| 0 to 1 inch | 0.1 | 0 4 | 0 4 | 1 0 | 3 7 | 55 0 | 39.4 |
| 1 to 10 inches | .0 | .1 | 1 | .3 | 1.8 | 54.9 | 42.8 |
| 10 to 18 inches | 0 | .1 | .1 | .3 | 1.3 | 54.5 | 43.7 |
| 18 to 25 inches | .0 | .1 | .1 | .4 | 1.7 | 52 7 | 45.1 |
| 25 to 42 inches | .0 | .1 | .1 | .2 | 2 6 | 53 1 | 43 9 |
| 42 to 70 inches | 0 | .0 | .0 | .3 | 3.7 | 55.5 | 40.5 |
| 70 to 84 inches | 0 | 1 | .1 | .3 | 4 7 | 58 1 | 36.6 |
| 84 to 102 inches | .0 | .1 | .1 | .3 | 4 5 | 60 9 | 34.1 |

[1] Calcium carbonate content, 0 to 1 inch, 0 03 per cent; 1 to 10 inches, 0 32 per cent, 10 to 18 inches, 0.40 per cent, 18 to 25 inches, 0 51 per cent; 25 to 42 inches, 0.99 per cent, 42 to 70 inches, 0 44 per cent; 70 to 84 inches, 0 79 per cent, 84 to 102 inches, 1.62 per cent.

The most extensive soil in the county is Moody silt loam. This soil, although developed from loessial material similar to that underlying the deep phases of the Moody soils, occupies the gently or strongly rolling parts of the upland, where more of the precipitation is lost as run-off and erosion is somewhat greater than on the deeper Moody soils.

The topsoil of Moody silt loam is as dark and apparently as well supplied with organic matter as that of the deep phase of Moody silt loam, but it is considerably thinner, and the zone of maximum carbonate accumulation lies much nearer the surface of the ground than in the phase. Following is a profile description of typical Moody silt loam observed in sec. 28, T. 27 N., R. 4 E.

From 0 to 8 inches is very dark grayish-brown friable silt loam which is imperfectly granular or structureless. The material is faintly calcareous at the surface of the ground and below a depth of 5 inches contains scattered small hard rounded lime concretions from one-sixteenth to one-eighth inch in diameter. From 8 to 26 inches is loose structureless silt loam, brown in the upper one-third and yellowish gray in the remainder of the layer. This layer contains an abundance of carbonate concretions similar to those in the lower part of the layer above. From 26 to 64 inches the material is similar to the lower part of the overlying layer, except that the concretions are scarce and practically disappear below a depth of 4 feet.

Table 7 gives the results of mechanical analyses of samples of Moody silt loam taken at different depths.

TABLE 7.—*Mechanical analyses of Moody silt loam* [1]

| Depth | Fine gravel | Coarse sand | Medium sand | Fine sand | Very fine sand | Silt | Clay |
|---|---|---|---|---|---|---|---|
| | *Per cent* | *Per cent* | *Per cent* | *Per cent* | *Per cent* | *Per cent* | *Per cent* |
| 0 to 1 inch | 0 0 | 0 4 | 0 3 | 0.8 | 2 7 | 57 6 | 38.0 |
| 1 to 8 inches | .1 | .5 | .3 | .5 | 2 1 | 54.7 | 41.6 |
| 8 to 26 inches | .4 | .3 | .2 | .3 | 2.4 | 61 2 | 35.3 |
| 26 to 48 inches | .0 | .0 | .1 | .1 | 2.0 | 65.4 | 32.4 |
| 48 to 84 inches | .0 | .1 | .1 | .2 | 2.7 | 63.3 | 33.7 |

[1] Calcium carbonate content, 0 to 1 inch, 2.67 per cent, 1 to 8 inches, 5 16 per cent, 8 to 26 inches, 12.17 per cent, 26 to 48 inches, 8 46 per cent, 48 to 84 inches, 8.74 per cent.

In this soil a pronounced zone of lime enrichment occurs between depths of 8 and 26 inches. This zone may vary somewhat in thickness and in depth below the surface of the ground in different localities, but it is invariably present within a depth of 5 feet in all Moody soils except those classed as deep phases, in which, if present, it lies 8 or 10 feet below the surface of the ground.

Crofton silt loam, as mapped in Dixon County, includes areas in which the dark-colored topsoil has been removed by erosion almost as rapidly as it has formed. If erosion had been less active, typical Moody silt loam would have been developed. The underlying B horizon with its high content of lime concretions is within a few inches of the surface.

Knox silt loam occupies, in general, steeper slopes and sharper ridges than any other loess-derived soil in the county. It occurs mainly in the Missouri River bluff section where the land is badly dissected by drainage ways. The soil is in a less mature stage than the soils of the Moody and the Crofton series, and it consists largely of unweathered or only slightly weathered loess. The surface horizon does not exceed 8 inches in thickness. It consists of grayish-brown or light grayish-brown silt loam that rests directly on unweathered loess. The soil material is calcareous throughout. Knox silt

loam differs from Crofton silt loam in the lighter color of its surface soil and its lack of a layer of lime concretions.

The Dickinson soils are the only sandy soils in the upland. They occur in a comparatively narrow northwest-southeast extending strip on the divide between Logan Creek and South Creek. These soils are composed largely of gray sand which has been exposed to weathering through the removal of the light-colored upland loess. The sand is probably of glacial origin, but if so it overlies the true glacial drift and although not entirely free from gravel contains no bowlders. The soils which have weathered from this drift have accumulated considerable organic matter and have dark grayish-brown or very dark grayish-brown topsoils from 8 to 15 inches deep. The subsoils are a trifle browner to a depth of 3 or 4 feet than the sand from which they have developed, but they contain no definite zones or layers and are little altered by weathering. The soils are leached of their carbonates.

Shelby loam occupies a few small bodies in the upland where erosion has removed the gray upland loess and the underlying sand, exposing the reddish-brown glacial drift to weathering. The drift is composed of a heterogeneous mixture of sand, silt, clay, and gravel, together with a few bowlders, and it is very variable in composition from place to place. Most of the exposures have been covered to a depth ranging from 6 inches to 2 feet by loess which has slumped down from higher levels. The topsoil much resembles that of Moody silt loam, except that it contains a little more sand and gravel. The upper subsoil layer in areas where the loess cover exceeds 18 inches in thickness is similar to the corresponding layer of Moody silt loam, even to the extent of containing an abundance of white lime concretions, but over most of the areas of this soil the subsoil is a brown or grayish-brown silt, sand, clay, and gravel mixture resembling the parent drift, and it is not calcareous to a depth below 3 or 4 feet.

Boyd clay occupies small scattered bodies wherever erosion has cut through the loess, sand, and glacial drift and exposed a bluish-colored limy shale to weathering. All the bodies occur in the Missouri River bluff lands in the northern part of the county where they occupy the lower slopes of the more deeply intrenched valleys. The shale in these exposures is intricately ramified with narrow seams and cracks filled with finely divided lime, and the soil material as a whole is remarkably open and porous considering its fine texture. Considerable organic matter has accumulated in the surface layer, and the topsoil of Boyd clay in Dixon County is much darker than that of the Pierre soil in northwestern Nebraska. The topsoil averages about 10 inches in thickness and consists of very dark grayish-brown or almost black heavy clay or clay loam. It rests directly on the limy unweathered or only partly weathered parent shale. The soil is calcareous throughout.

The stream terraces of Dixon County are occupied by the Hall and Waukesha soils, all of which have developed from gray loess similar to that underlying the Moody and Knox soils of the upland but which was carried to its present position as sediment and deposited in the flood plains by streams when they were flowing at higher levels. All the terrace soils have accumulated an abundance of organic matter in their topsoils which are very dark grayish brown or black and from

12 to 18 inches deep. The terraces lie well above overflow and are well drained, and the material composing them has lain in its present position long enough to have developed into soils having definite zones or layers of true soil character. In fact, the Waukesha soils are identical in their characteristics with the deep phases of the Moody soils and are separated from the Moody soils on the accompanying map only on account of their lower position and their consequent more favorable crop-moisture supply.

The Hall soils differ from the Waukesha soils only in that they have a definite zone of lime enrichment in their subsoils, which occurs between average depths of 4 and 5 feet. It greatly resembles the corresponding zone in Moody silt loam, but most of its lime is in finely divided form thoroughly mixed with the silt and very few lime concretions occur.

A few small areas of soil have developed on materials recently removed from the upland by surface wash or colluvial action and deposited near the base of the more gradual slopes, on narrow valley floors, or on gently sloping terraces. The deposits are very dark, having been derived chiefly from the surface layers of dark-colored upland soils. They are of such recent age that the soils developed from them have not acquired definite zones or layers. These soils are the Judson soils which are very dark grayish brown or black, have no definite structure, are uniform in color and texture to a depth below 3 or 4 feet, and have been leached of their carbonates.

The Lamoure, Wabash, Cass, and Sarpy soils occupy the first bottoms or flood plains. These soils have developed from sediments recently deposited in the stream valleys during periods of overflow. Subsequent intrenchment of the channels has left the deposits above overflow in nearly all places, but the underlying water table is everywhere within a few feet of the surface of the ground, especially during high stages of the streams.

The moist conditions prevailing in the flood plains have especially favored vegetative growth and decay, and all the transported sediments, except those most recently deposited, have dark-colored surface layers. However, sufficient time has not elapsed for the development of soils having definite horizons of true soil character.

The lower parts of the deposits have remained too wet in most places for thorough aeration and oxidation, and the upper parts usually rest directly on unweathered or only slightly weathered material. The character of the stream-deposited material, therefore, is the controlling factor in determining the character of the flood-plain soils.

Those soils in the flood plains which have developed from fine-textured sediments (silts and clays) are classed with the Lamoure and Wabash soils. They have faintly granular friable and almost black topsoils from 12 to 14 inches thick. The subsoils are moderately compact, owing to a rather high clay content, but they have no claypanlike characteristics and are practically structureless. The subsoils of the Wabash soils are similar to or slightly darker than the topsoils in color, and they are very low in lime. The subsoils of the Lamoure soils are light grayish brown, grayish brown, or mottled gray and white, and they contain an abundance of lime both in concretionary and disseminated form.

The flood-plain soils which have developed from the coarser-textured sediments (sand and gravel) are classed with the Cass and Sarpy soils. The Cass soils have accumulated considerable organic matter, and their topsoils are as dark and almost as thick as the corresponding layers of the Lamoure and Wabash soils. The Sarpy soils have developed on the most recently deposited sandy sediments and are poorly supplied with organic matter, their topsoils being very thin and prevailingly light in color. The subsoils of the Cass and Sarpy soils are composed of loose gray sand and gravel, the gravel usually becoming more abundant with depth. The soils may or may not contain lime, but if they do, the carbonates are in finely divided form and rather evenly distributed throughout the soil mass.

## SUMMARY

Dixon County is in northeastern Nebraska. It is roughly rectangular in shape and comprises an area of 472 square miles, or 302,080 acres. About 85 per cent of the county is upland which ranges from nearly level to extremely rough and broken. The rougher sections are in the Missouri River bluff lands in the northern part. The surface relief of the alluvial land is nearly level or very gently undulating. The average elevation of the county is about 1,400 feet above sea level.

Surface drainage is well established except locally in the bottom lands along Logan Creek and Missouri River.

The first permanent settlement was made near the present site of Ponca in 1856. According to the census, the population of the county was 11,586 in 1930. The farm buildings are generally kept in good repair and nearly every farm is well fenced.

The county is crossed in several directions by railroads or gravel-surfaced highways. The public-school system is well developed.

The climate is well suited to grain farming and livestock raising. The mean annual temperature as recorded at Wakefield is 48° F., and the mean annual precipitation is 28.63 inches. The average frost-free season is 148 days.

The agriculture consists of diversified farming including grain and hay production and the raising of livestock. The leading crops are corn, oats, wild hay, and alfalfa, ranking in acreage in the order named. According to the Nebraska Agricultural Statistics corn occupied 58.5 per cent, oats 25.3 per cent, wild hay 6 per cent, and alfalfa 4.5 per cent of the cultivated land in 1929. No commercial fertilizer is used but all manure produced is applied to the land.

The raising and fattening of cattle and hogs are the most important branches of the livestock industry. The feeder cattle are raised chiefly in the rougher sections throughout the northern part of the county, and most of them are fattened on the corn and alfalfa lands in the southern part. The work animals are of good quality, and automobiles, trucks, gasoline engines, and tractors are in general use.

Dixon County is in the prairie region of the United States, and most of the soils have dark-colored topsoils, owing to an abundance of black organic matter derived from decayed grass roots. Most of the soils are well drained, have high moisture-retaining powers, are friable throughout, and are well supplied with lime. The only sandy soils are in the upland north of Logan Creek and in the bottom land

along Missouri River. Dark-colored soils occupy about 82 per cent and light-colored soils about 12 per cent of the total county area.

Moody silt loam is the most extensive soil in the county. It occupies the gently or steeply rolling parts of the loessial uplands and has a well-developed dark-colored topsoil from 8 to 12 inches thick. The subsoil is friable and very limy. This soil is well adapted to all crops common to the region and is very productive. It is the most important general-farming soil.

The Hall and Waukesha silt loams occupy terrace positions along the larger streams. They are similar in their principal characteristics to Moody silt loam although the Waukesha soil is not quite so well supplied with lime. These soils are as well adapted to all crops grown in the county as the Moody soil; they are better supplied with moisture and are therefore a little more productive than that soil; but they occupy only a small total area and are of minor agricultural importance.

The Dickinson soils occupy the more sandy parts of the upland. Their topsoils, although dark colored owing to a fairly high organic-matter content, are composed largely of sand and are less stable than those of the Moody, Hall, and Waukesha soils. The subsoils are composed of loose rather incoherent gray sand. These soils are fairly well adapted to corn, but small grains are usually injured by the shifting sand and give low yields in all except the most favorable years.

Knox silt loam is the most extensive light-colored soil in the county. It occurs chiefly in the northern part in the bluff lands bordering the Missouri River Valley. The soil has been subjected to severe erosion and only a small part of it is topographically suited to cultivation. It has developed from loess similar to that underlying Moody silt loam, but its topsoil is very thin and low in organic matter. Some corn, alfalfa, and sweetclover are grown in the less eroded areas, but most of the soil is used for grazing land.

The Wabash, Lamoure, Cass, and Sarpy soils occupy first-bottom or flood-plain positions. They have developed from sediments deposited by the streams during periods of high water. All except the Sarpy soils have accumulated an abundance of organic matter and have dark-colored topsoils.

The Wabash, Lamoure, and Cass soils are the most productive corn and alfalfa soils, but are not well adapted to small-grain crops on account of their high moisture supply. The Sarpy soils are composed almost entirely of sand and are of little value except for grazing land.

○

[Public Resolution—No. 9]

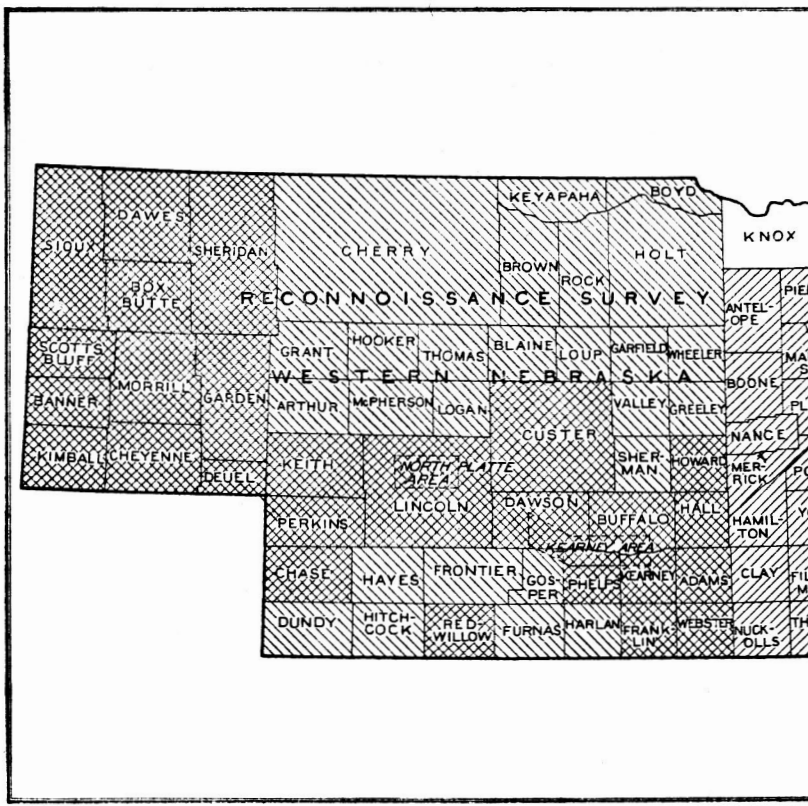
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

*Resolved by the Senate and House of Representatives of the United States of America in Congress assembled,* That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided,* That in addition to the number of copies above provided for there shall be printed as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative for the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved, March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils.]




Areas surveyed in Nebraska, shown by shading

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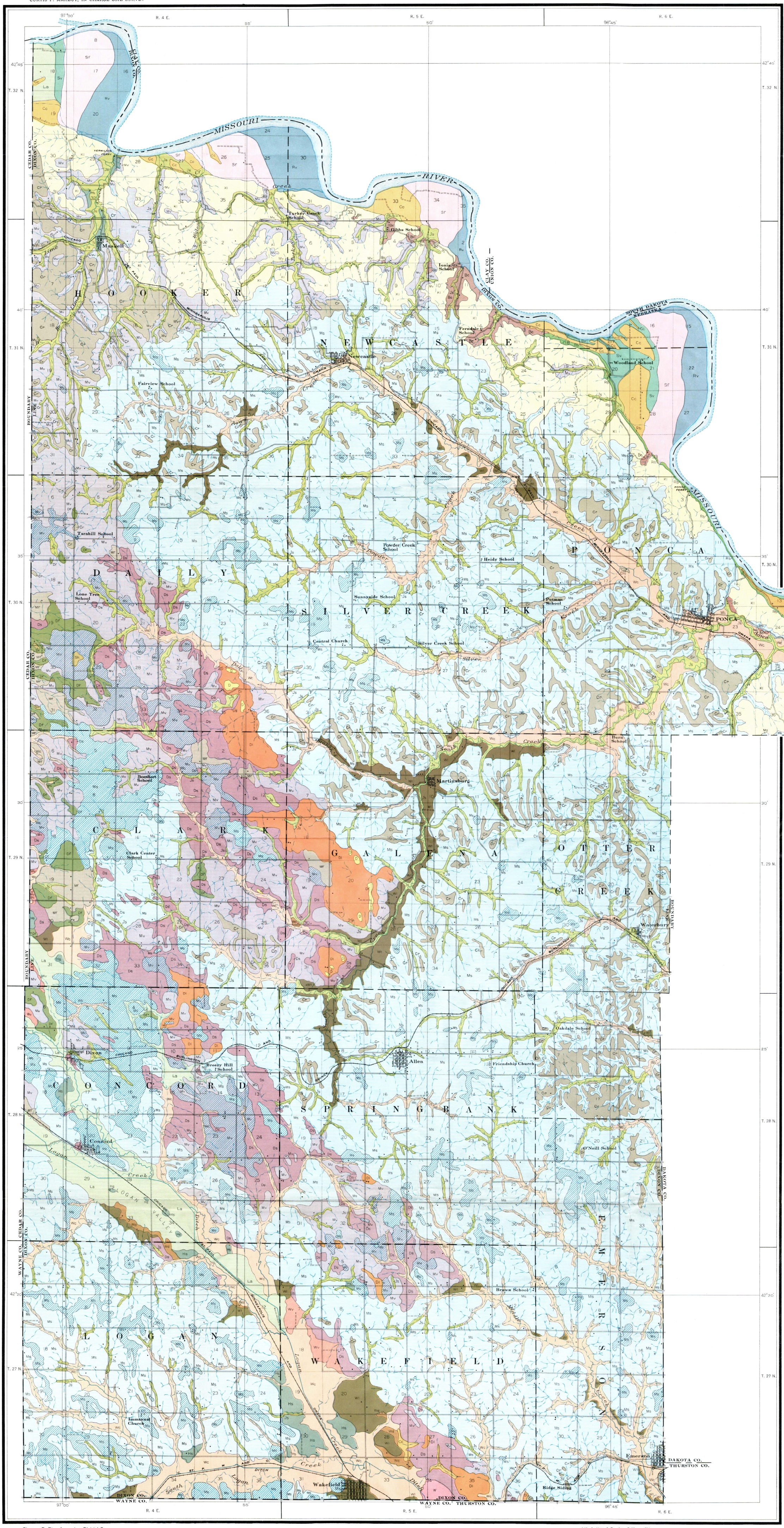
U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF CHEMISTRY AND SOILS
HENRY G. KNIGHT, CHIEF
A. G. McCALL, CHIEF, SOIL INVESTIGATIONS
CURTIS F. MARBUT, IN CHARGE SOIL SURVEY

# SOIL MAP
## DIXON COUNTY
## NEBRASKA

UNIVERSITY OF NEBRASKA
STATE SOIL SURVEY DEPARTMENT OF THE
CONSERVATION AND SURVEY DIVISION
G. E. CONDRA, DEAN AND DIRECTOR




## LEGEND

- Cass clay — Cc
- Moody silt loam — Ms
- Dickinson loamy sand — Dl
- Ms — Deep phase
- Dickinson sandy loam — Ds
- Boyd clay — Bc
- Dickinson fine sandy loam — Df
- Sarpy fine sandy loam — Sf
- Hall silt loam — Hs
- Sarpy very fine sandy loam — Sv
- Judson silt loam — Js
- Shelby loam — Sh
- Knox silt loam — Kl
- Wabash clay loam — Wc
- Lamoure clay loam — La
- Waukesha loamy sand — Wd
- Moody fine sandy loam — Mf
- Waukesha very fine sandy loam — Wv
- Moody very fine sandy loam — Mv
- Waukesha loam — W
- Mv — Deep phase
- Waukesha silt loam — Wl
- Dune sand — D
- River wash — Rv
- Rough broken land — Rb
- Crofton silt loam — Cr

## CONVENTIONAL SIGNS

### CULTURE
*(Printed in black)*

- City or Village, Roads, Buildings, Wharves, Jetties, Breakwater, Levee, Lighthouse, Fort.
- Secondary roads and Trails
- Railroads, Steam and Electric (DOUBLE TRACK, SINGLE TRACK, JUXTAPOSITION, IN ROAD)
- Bridges, Ferry
- R.R. crossings, Tunnel (R.R. ABOVE, R.R. BELOW)
- Ford, Dam
- School or Church, Cemeteries (CEM)
- Mine or Quarry, Mine dumps, Made land
- Bluff, Escarpment, Rock outcrop and Triangulation station
- Stony and Gravelly areas
- Soil boundaries
- Boundary lines (STATE, COUNTY)
- Boundary lines (LAND GRANT, CITY OR VILLAGE)
- Boundary lines (CIVIL TOWNSHIP, RESERVATION)
- U.S. township and section lines

### RELIEF
*(Printed in brown or black)*

- Contours, Depression contours (1060, 170, 940, 860)
- Prominent Hills, Mountain Peaks
- Sand, Wash, and Sand dunes
- Shore and Low-water line, Sandbar

### DRAINAGE
*(Printed in blue)*

- Streams
- Lakes, Ponds, Intermittent lakes
- Intermittent streams
- Springs, Canals and Ditches, Flumes
- Swamp, Salt marshes
- Submerged marsh Tidal flats

*The above signs are in current use on the soil maps. Variations from this usage appear in some maps of earlier dates.*

Thomas D. Rice, Inspector, District 3.
Soils surveyed by A. W. Goke, U. S. Department of Agriculture, in charge, and L. A. Brown, Nebraska Soil Survey.

1 ½ 0 1 2 3 4 Miles
Scale 1 inch-1 mile

Lith. A. Hoen & Co., Inc., Baltimore, Md.

Field Operations
Bureau of Chemistry and Soils
1929